VARIABLES ASSOCIATED WITH INTENT TO USE LEARNING STYLE PREFERENCE INFORMATION BY UNDERGRADUATE NURSING STUDENTS

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ABSTRACT

Nancy Marie Burruss

VARIABLES ASSOCIATED WITH INTENT TO USE LEARNING STYLE PREFERENCE INFORMATION BY UNDERGRADUATE NURSING STUDENTS

Increasing the success of diverse undergraduate students is central to the mission of many nursing programs. Numerous programs administer learning style inventories in order to obtain baseline information about students' learning needs. However, little is understood about students' intent to use the learning style preference information.

The purpose of this study was to examine variables associated with intent to use learning style preference information by undergraduate nursing students. Variables included demographic, academic, and learning style preference variables as well as students' ability to explain learning style preference information, obtained from a commercial learning style inventory. A purposive convenience sample (N = 219) was obtained from six baccalaureate nursing programs in different geographical areas to achieve adequate learner diversity for the variables to be studied.

A researcher-developed survey entitled *Intent to Use Learning Style Preference Information* was used to collect study data. Students responded to questions regarding demographic, academic, and learning style preference information. Pearson correlation, independent samples *t* test, analysis of variance, and multiple linear regression methods were used for statistical analyses.

The significant variables of type of BSN program, years of education, person who shared results, perception of usefulness of learning style assessment, and ability to explain learning style preference information, when entered into the regression model,

accounted for 32.5% of the variance in the intent to use learning style preference information, $F(5, 198) = 19.07$, $p < .001$. Intent to use learning style preference information was greater for BSN students in four-year programs as opposed to accelerated programs, those with fewer overall years of education, whose results were shared by an academic advisor rather than faculty, who perceived their learning style assessment as useful, and who had high ability to explain their learning style preference information.

Evaluation of fiscal resources required for administration of learning style inventories and perceived usefulness of the information by students is critical. Implications from this study include ensuring students' ability to understand and explain their learning style preference information, as well as providing strategies that students can utilize throughout their curriculum. Further research is recommended to determine the impact of implementation strategies.

Diane M. Billings, EdD, RN, FAAN, Chair

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ABBREVIATIONS

Abbreviations	Terms
AACN	American Association of Colleges of Nursing
ATI	Assessment Technologies Institute
BSN	Bachelor of Nursing Science
CVI	Content Validity Index
GEFT	Group Embedded Figures Test
GPA	Grade point average
LSI	Learning Style Inventory
NLN	National League for Nurses
PEPS	Productivity Environmental Preference Survey
RN	Registered Nurse
SAI	Self Assessment Inventory
VARK	Visual, Auditory, Read/write and Kinesthetic

CHAPTER ONE

INTRODUCTION

The National League for Nursing's Core Competencies for Nurse Educators (Competency 2) states that educators must facilitate current student development and socialization by identifying individual learning style preferences and the unique learning needs of culturally diverse (including international); traditional versus non-traditional; at-risk (e.g., educationally disadvantaged, learning and/or physically challenged, social, and economic issues) learners (Finke, 2009; Kalb, 2008; National League for Nurses [NLN], 2005b). Given the significant shortage of nurse faculty and increasing class sizes, nurse educators are challenged to identify learning style preferences and develop appropriate learning experiences that will meet the complex needs of the current nursing student (Fountain & Alfred, 2009; Ironside & Valiga, 2006). Learning style preferences should be identified early in the undergraduate nursing curriculum with the hope to empower individual students to use their knowledge of learning style preferences in order to achieve positive outcomes (Holstein, Zangrilli, & Taboas, 2006) especially in large classes where students at risk may go unnoticed.

Statement of the Problem

Empowering students with the ability to explain their learning style preference information may enhance their intent to use this information. For as much as this information may be a catalyst capable of igniting student success, this can also be inhibited by nursing programs who fail to inform students of their learning style preference information or if students are unable to explain their learning style preference information. Students who lack this information may have their academic success

compromised. Based on this, evidence-based research on students' intent to use learning style preference information should be a high priority for nursing programs looking to promote successful academic achievement.

The National Health Care Agenda directs the efforts of nursing programs to increase retention and success of diverse students (Emerson & Records, 2008). Since a diverse environment is central to the mission and the academic goals of many institutions, strategies that maximize the potential for success of diverse students need to be tailored to fit each individual's unique preferences for learning (Evans, 2008). The NLN's Nursing Education Research 2010 Grants Program has determined that priority will be given to projects involving success of diverse student populations (NLN, 2009a).

Students are diverse in their educational and work experiences, cultural backgrounds, four-year versus accelerated bachelor of nursing science (BSN) program enrollments, and at-risk status. There appears to be a shift to an older, second career student versus a student entering nursing school directly after high school (Clausing, Kurtz, Prendeville, & Waltz, 2003; Linares, 1999). Achievement gaps continue to exist for diverse students as evidenced by lower graduation rates among institutions serving high proportions of minority, low-income, and first-generation college students (Brown & Marshall, 2008).

As a result of this diversity, it is unlikely that any single learning style preference would be identified for all or most students. And, although nurse educators vary the teaching approaches they use, they tend to differentiate instruction for the entire class rather than individuals (Dunn & Griggs, 2000). The lack of student mastery of course concepts may be an outcome of the educator's lack of awareness of how differently

students in the same class actually learn. In a large class, where students are likely to have every learning style preference represented, if faculty teach in a way that most appeals to them, they are very likely to alienate large numbers of students (Heppner, 2007). In order to address the diversity of current students and the need to increase retention and success of each student, an understanding of the intent to use learning style preference information by the current student population is important.

The learning style preferences of undergraduate nursing students are commonly being assessed by using commercial tests such as the Self Assessment Inventory (SAI), a standardized learning style assessment developed by Assessment Technologies Institute (ATI), early in the curriculum (ATI, 2000). There are costs involved with these assessments which may be paid by the student at the beginning of the nursing program or on a semester-by-semester basis. Students may resist taking the SAI, especially if they feel the information is not useful to them. After administering the assessment, nursing programs should share individual results with each student so he/she has the ability to explain their own learning style preference information. By doing this, students may feel there is value in taking the assessment and that using the learning style preference information will contribute to their academic success in the nursing program and NCLEX-Registered Nurse (RN) exam.

Burruss (2009b) performed a critical literature review of 42 original research manuscripts on the learning styles of adult learners conducted between 1980 and 2008 in online and traditional on-campus environment. The findings of these investigations revealed identification of what students' learning style preferences were based on the specific learning styles instrument used. However, in the literature, there was no

indication if students actually received information about their learning style preferences, were able to explain their learning style preference information or if they ever intended to use their learning style preference information to enhance their study skills and overall learning.

The existing literature had abundant research addressing the learning styles of various undergraduate nursing student groups, and although students were being assessed for their learning style preferences, there was lack of evidence regarding whether students were ever informed of and/or had the ability to explain their learning style preference information, which may have a relationship to their intent to use learning style preference information (Burruss, 2009). Based on this gap in the literature, research was needed that examined demographic, academic, and learning style preference information in diverse students.

Purpose of the Study

The purpose of this dissertation research was to examine variables associated with intent to use learning style preference information by undergraduate nursing students. The research question was among current students enrolled in undergraduate baccalaureate nursing programs, which variables (demographic variables: age, gender, race/ethnicity, number of dependents, number of hours per week care of dependents, current employment, type of work experience, and hours per week work for pay; academic variables: grade point average (GPA), type of BSN program, and years of education; ATI SAI information variables: when taken, who shared results, how results received, read results, what information reported, type of learning style preferences, understanding of results, and usefulness of learning style assessment; and ability to

explain learning style preference information) are significantly related to student intent to use learning style preference information?

Significance of the Study

With the Bureau of Labor Statistics projecting the need for more than one million new and replacement registered nurses by the year 2016, nursing schools around the country are exploring creative ways to increase student retention and reach out to current student populations. The challenge inherent in these efforts is to quickly produce competent nurses while maintaining the integrity and quality of the nursing education provided (American Association of Colleges of Nursing [AACN], 2008). Nurse educators would be wise to determine the preferred learning styles of the current students in their nursing courses (Emerson & Records, 2008). These efforts may enhance the successful academic outcomes of diverse students.

Acknowledgment of diverse students' learning style preferences enhances the learning environment while supporting academic achievement (Choi, Lee, & Jung, 2008). Currently, obtaining knowledge of learners' demographic and academic characteristics is a vastly underutilized approach to improving teaching/learning strategies. To address this concern, students' learning style preferences should be understood (Slater, Lujan, & DiCarlo, 2007).

Ethnic and racial diversity of nursing schools has increased dramatically, creating a rich cultural environment for learning. According to the AACN's (2008) Annual Survey on race and ethnicity of students enrolled in baccalaureate nursing programs, the number of students from minority backgrounds remains high at 26%. The percentage of men in baccalaureate nursing programs is now 12% (NLN, 2009b). Students are entering

nursing schools at varying ages and are bringing vast educational and work experiences, as well as more sophisticated expectations for their learning. Many students are employed in full-time positions, and are raising families, which places constraints on their educational experiences and demands greater flexibility in scheduling (Heller, Oros, & Durney-Crowley, 2009).

The NLN's Core Competencies for Nurse Educators (Competency 1) states that to facilitate learning effectively, the nurse educator should implement a variety of teaching strategies appropriate to learner needs; recognizing multicultural, gender, and experiential influences on teaching and learning; and desired learner outcomes (Finke, 2009; Kalb, 2008; NLN, 2005b). A *one-size-fits-all* education is likely to stress and discomfort many students who, otherwise, might perform well if their individual uniqueness were recognized and responded to instructionally (Reese & Dunn, 2007). Current students are striving to reduce achievement gaps, and it is important that educators augment their efforts (Brown & Marshall, 2008).

Quality nursing education demands development of educational environments that embrace diverse learning styles (AACN, 2008). Learning style has noticeable influences on the effectiveness and outcomes of learning (Jen-Hwa Hu, Hui, Clark, & Tam, 2007). Learning style preferences should be identified early in the nursing curriculum with the intent of empowering individual students to use their learning style preference information in order to achieve positive outcomes. Individual students should be assisted in identifying and understanding their learning style preference information and then informed on how to use this information to improve study habits, and select courses or work environments compatible with their learning style preferences (Reese & Dunn,

2007). Use of learning style preference information by individual students may enhance retention and graduation rates of the current diverse student body.

Students might profit substantially from knowledge of how to accommodate their own learning style preferences. This information should guide students toward doing their homework with strategies responsive to their individual styles (Reese & Dunn, 2007). In class, some students benefit from increased interaction with the faculty, the scheduling of periodic meetings, and frequent feedback on submitted assignments. Faculty may recommend that a student complete an assignment individually, in a pair, or in a group. From an administrative perspective, learning style preference information may provide assistance in scheduling theory and clinical courses for current students (Reese & Dunn, 2007).

Research Question

This study sought to answer the question: Among current students enrolled in undergraduate baccalaureate nursing programs, which variables (demographic, academic, ATI SAI information; and ability to explain learning style preference information) are significantly related to students' intent to use learning style preference information?

Definition of Terms

A number of terms were associated with this study. The ATI SAI used the following definition of learning style preference: The modality by which an individual synthesizes, assimilates or internalizes information. Five specific styles identified by the SAI included visual, auditory, or tactile learner; group or individual learner (ATI, 2000). An investigator-developed survey, *Intent to Use Learning Style Preference Information* (Burruss, 2009a), was used to measure student demographic, academic, and ATI SAI

information variables. The meaning and operational definitions of the following variables for this study are indicated below:

Demographic Variables

1. *Age*: Students indicated their age in years.
2. *Gender*: Students indicated as male or female.
3. *Race/ethnicity*: Students indicated their race as White/Caucasian, Black/African American, Hispanic/Latino, American Indian/Alaskan Native, Asian American/Pacific Islander, or Other.
4. *Number of dependents*: Students indicated the number of dependents for which they were responsible.
5. *Number of hours/week care of dependents*: Students indicated the number of hours per week on average they spent caring for dependent(s).
6. *Current employment*: Students indicated whether they were currently employed.
7. *Type of work experience*: Students indicated the type of work experience they had (e.g., nursing/healthcare, business, education, sales, office support, other, or none).
8. *Hours per week work for pay*: Students estimated the number of hours per week they worked for pay.

Academic Variables

1. *GPA*: GPA measured academic achievement. The self-reported GPA was the best predictor of student achievement available, given the impracticality of obtaining actual student transcripts (Kuncel, Crede, &

Thomas, 2005). Students indicated their cumulative college GPA as of the most recent semester/term based on a 4.0 scale.

2. *Type of BSN program*: Students indicated whether they were enrolled in a four-year program option or an accelerated program option that ended in a baccalaureate degree in nursing. Students in the accelerated program option had previous college experience and were enrolled in a compressed, *fast track*, or accelerated course of study in nursing.
3. *Years of education*: Students indicated the total number of years of education they had attained.

ATI Self Assessment Inventory Information Variables

1. *When taken*: Students indicated the point in their program of study they took the ATI SAI (e.g., during orientation, in the first semester, in the second semester, in the second year, or other).
2. *Who shared results*: Students indicated the individual or individuals who shared their learning style results with them (e.g., such as ATI coordinator, faculty, academic advisor, director, dean, staff member, or other).
3. *How results received*: Students indicated how they received their results (e.g., in individual or group discussion sessions, by printed copy of results, by e-mail, or other).
4. *Read results*: Students indicated whether they read their ATI SAI results.
5. *What information reported*: Numerical scores reported to the student indicated the learner type, interpretation of numeric scores, strategies to enhance learning preferences, or other.

6. *Type of learning style preferences*: The SAI (ATI, 2000), which was administered by the student's nursing program, assessed learning style preferences. Learning style preferences were self-reported as a visual, auditory, or tactile learner, and as an individual or group learner.
7. *Understanding of results*: Students indicated whether they understood the meaning of their ATI learning style scores.
8. *Usefulness of learning style assessment*: Students indicated whether their learning style assessment was useful to them.
9. *Ability to explain*: The *Intent to Use Learning Style Preference Information Survey* (Burruss, 2009a) was used to measure the ability to explain. Students rated their ability to explain learning style preference information that they obtained from the previously completed ATI SAI. Respondents rated 13 items on a 5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Subconcepts of *ability to explain* were knowledge (acquisition and ability to recall information) and comprehension (ability to understand what was being communicated) of learning style preference information (Bloom, 1956).
10. *Intent to use*: Students indicated plans to use learning style preference information. Students rated their intent to use the learning style preference information that they obtained from the ATI SAI. Respondents rated their intent to use learning style preference information on a 5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

11. *Learning style preference information*: Students received information regarding their learning style preferences.

For the purposes of this research study, demographic variables included age, gender, race/ethnicity, number of dependents, number of hours per week care of dependents, current employment, type of work experience, and hours per week work for pay. The academic variables included GPA, type of BSN program, and years of education. The ATI SAI information variables included when the assessment was taken, who shared results, how results received, read results, what information reported, type of learning style preferences previously assessed by the ATI SAI (ATI, 2000), understanding of results, and usefulness of learning style assessment. The ability to explain learning style preference information was measured by a subscale on the survey. The outcome variable, intent to use learning style preference information was also measured by a subscale on the study survey. The aim of this study was to determine the combination of independent variables significantly related to the intent to use learning style preference information guided by a theoretically based conceptual model.

Conceptual Framework

The framework was developed based on a review of the literature on the learning styles of adult learners (Burruss, 2009b, Figure 1). The proposed model was used to guide an exploration of the relationships that may be significantly related to intent to use learning style information. Each variable was derived from the review of the literature as it relates to learning style preference information. This model examined which independent variables (demographic, academic, ATI SAI information; and ability to explain learning style preference information) were most closely associated with the

outcome variable, intent to use learning style preference information. After the conceptual model was initially tested, the *ability to explain* variable subsumed the subconcepts of *knowledge* and *comprehension* of learning style preference information variables and proved to be a better fit in the model.

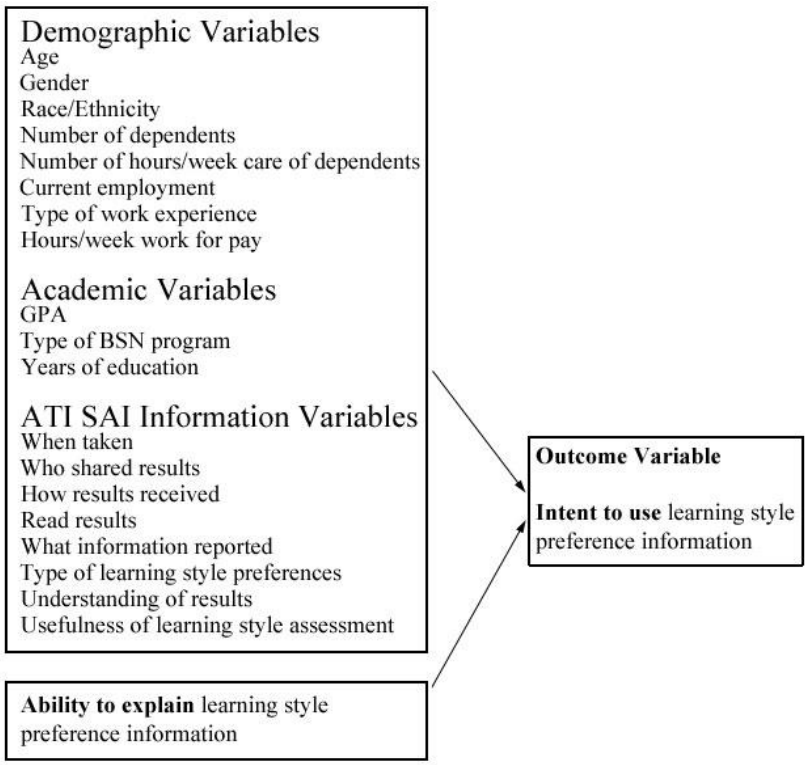

Figure 1. Conceptual Model of Intent to Use Learning Style Preference Information. Copyright 2009 by N. M. Burruss.

Assumptions and Limitations

Assumptions

The assumptions of this study were based on the principles that most individuals can learn and that everyone has strengths, but different people have different strengths (Dunn & Dunn, 1978). One assumption was that the research subjects would be representative of current undergraduate nursing students. The second assumption was that survey responses would be accurate. The third assumption was that each subject

would have had their individual learning style preferences assessed by the ATI SAI administered by their BSN nursing program.

Limitations

This study was limited by a descriptive design and selection bias due to voluntary participation. Convenience sampling limits the generalizability of the findings to the population. Homogeneity of the sample increased risk of bias by not using random sampling. Not all data were collected during the same semester/term after taking the ATI SAI. The sample had an uneven statistical distribution of gender and race/ethnicity but reflected the NLN demographic profile of current BSN students (NLN, 2009b). *English as a second language* for some subjects responding to the survey in English as well as self-reported measures may have limited the objectivity of the findings. Limitations would have occurred if students did not receive their results or did not get any information from ATI or the nursing program after they had been assessed. However, even if the student received their results, they may have not read or understood them. The limitations in this study were acceptable considering the early exploratory nature of the conceptual model.

Organization of Study

Chapter One provides the background of the study which established the importance of the independent variables and the outcome variable intent to use learning style preference information in the statement of the problem, purpose and significance of the proposed research. The research question, definition of terms, conceptual framework and model, assumptions, and limitations are also identified in Chapter One.

Chapter Two presents the review of literature related to this study's conceptual framework. The chapter introduction is followed by a discussion of the conceptual issues of learning styles such as the variation in definitions of learning style, conceptual frameworks and model descriptions, learning styles instruments, and key characteristics of learning styles. Independent variables and gaps in the literature are discussed as they link to the model.

Chapter Three discusses the methodology, instrument development, data collection, and data analysis used to conduct the study. The ATI SAI (ATI, 2000) is described including the reliability and validity data for the tool. The development of the *Intent to Use Learning Styles Information Survey* is explained.

Chapter Four reports the results of the data analyses related to the research question. Chapter Five provides a summary of the findings and conclusions, limitations, implications and recommendations for further research.

CHAPTER TWO

LITERATURE REVIEW

The literature review included the conceptual and empirical bases for the proposed research study. The review incorporated three major categories of literature related to the following: (a) conceptual issues of learning styles, (b) independent variables related to learning style and, (c) gaps in the literature related to students' ability to explain their learning style information and intent to use learning style preference information. Based on this review, the chapter concludes with a proposal for addressing the gaps related to undergraduate nursing students' ability to explain and intent to use learning style preference information.

Conceptual Issues of Learning Styles

As the diversity of current nursing students increases, educators in academic and clinical settings are searching for evidence-based methods that will address learning style preferences. A critical literature review on the learning styles of adult learners in the nursing, education, and psychology literature conducted between 1980 and 2008 in the online and traditional on-campus environment was performed. Hundreds of studies were identified from the keyword search of which 42 studies were selected utilizing the inclusion criteria. Of the 42 original research investigations that met the established inclusion criteria, 18 were studies of students learning in online courses and 23 were studies of students in traditional classroom courses. Sample sizes ranged from 12 to 1496 subjects from the various academic and clinical studies. Conceptual issues of learning style definitions, frameworks and model descriptions were described. Keywords such as learning styles, higher education, clinical education, and health care education; students,

adult and college; traditional and online courses or Web-based instruction were used for this literature search. Discussing learning style through a variety of sources allowed this concept to be explored from a diverse perspective.

Databases reviewed included Academic Search Premier, CINAHL, CINAHL with Full Text, ERIC, MEDLINE, PsycINFO, and Academic Search Elite. Online search engines used included Google and Google Scholar. Nursing, education, and psychology journals were reviewed. Nursing journals included *Computers in Nursing*, *Journal of Nursing Education*, *MedSurg Nursing*, *Nursing Education Perspectives*, *Nurse Educator*, *Journal of Professional Nursing*, *Nursing Research*, *Journal of Advanced Nursing*, *Nursing Outlook*, *Cancer Nursing*, *Nursing Standard*, and the *International Nursing Review*. Educational journals reviewed included *Computers & Education*, *Journal of Educational Computing Research*, *The American Journal of Distance Education*, *Journal of Computer-Based Instruction*, *Journal of Education Technology Systems*, *Engineering Education*, *International Journal of Engineering Education*, *British Journal of Educational Technology*, *Journal of College Student Retention*, *Journal of Agricultural Education*, *Advances in Physiology Education*, *The Internet and Higher Education*, *Journal of Educational Multimedia and Hypermedia*, *Engineering Education*, *Radical Pedagogy*, *The Journal of Educational Research*, *Journal of College Student Development*, *Education and Training*, and *Medical Education*. Psychology journals reviewed included *Educational Psychology*, *British Journal of Educational Psychology*, *Educational and Psychological Measurement*, and *Journal of Psychology*. Additional journals included the *Journal of Athletic Training* and the *Journal of Allied Health*. A

limited number of world conference papers, manuals, dissertations, and annual meeting papers were reviewed.

The articles synthesized met the following inclusion criteria: (a) published in English, (b) published by peer-reviewed sources, (c) populations in higher education, (d) traditional delivery and online delivery, (e) published between 1980 and 2008, (f) U.S. and international settings, and (g) focused on the concept of learning styles.

Definitions of Learning Style

Within the literature, there is a lack of a clear definition of learning styles that was operationalized consistently. The terms *learning styles* and *cognitive styles* were used interchangeably in the literature. Learning style was defined as the cognitive, affective, and psychological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Keefe, 1979) and individuals' preferred ways of perceiving and processing information (Kolb, 1984). Kolb defined learning style as a student's consistent way of responding to and using stimuli in the context of learning (Claxton & Murrell, 1987). Honey and Mumford (1992) adapted a variation on the Kolb (1984) definition. They defined learning style as a description of the attitudes and behavior that determines an individual's preferred way of learning.

Dunn, Dunn, and Price (1986) defined learning styles as the way in which each learner begins to concentrate on, process, and retain new and difficult information which is a biologically and developmentally imposed set of personal characteristics or traits. It is the manner in which a learner perceives, interacts with, and responds to the learning environment. Components of learning style are the cognitive, affective and physiological elements, all of which may be strongly influenced by a person's cultural background

(Dunn & Griggs, 2000). Their definition incorporated environmental, emotional, sociological, physical, and psychological preferences that affected how individuals' learn new and difficult information and skills (Dunn & Dunn, 1999). These definitions implied a stability or lack of significant change in learning style.

Grasha (1996) defined learning styles as personal qualities that influence a student's ability to acquire information, to interact with peers and the instructor, and otherwise to participate in learning experiences. Learning preference was related to the partiality that an individual had for a particular sensory mode or condition for learning, including a preference for certain learning strategies (Sutcliffe, 1993). Learning style was also defined as an attribute or characteristic of an individual who interacts with instructional circumstances in such a way as to produce differential learning outcomes (Linares, 1999). Fleming's (2001) learning style preference answered why people learned more easily or successfully by one method over another and the conditions under which learners most efficiently and effectively perceived, processed, stored, and recalled what they were attempting to learn. Learning style was also defined as the combination of the learner's motivation, and information-processing habits while engaged in the learning process (Aragon, Johnson, & Shaik, 2002) and how individuals acquired information and how it is processed or acted upon once acquired (Ames, 2003).

For the purpose of this research study, learning style was defined as used by the ATI SAI as the modality by which an individual synthesized, assimilated or internalized information. Five specific styles were identified by the SAI which included visual, auditory, tactile, group, and individual (ATI, 2000).

Learning Style Conceptual Frameworks and Model Descriptions

Similar to the large number of definitions for learning styles, there was not one accepted model of, or assessment for, learning style (Hickcox, 1995). Curry (1987) defined four areas of learning styles in an *onion* model: personality factors, social interaction preference, informational processing, and instructional preference (Claxton & Murrell, 1987). The Witkin (Witkin, 1962) and Myers-Briggs Type Indicator (MBTI) (Myers, 1962) models were described as the innermost personality factors models. Witkin's model is a bipolar construct with field dependence and field independence as opposite endpoints of a spectrum, which related to how much a learner is influenced by the surroundings (Swanson, 1995). The Group Embedded Figures Test (GEFT; Witkin, Oltman, Raskin, & Karp, 1971) was developed to classify learners on this continuum. The MBTI defined sixteen personality types via the use of four factors: (a) extraversion (focus on people)/introversion (ideas); (b) sensors (detail oriented)/intuitors (imagination oriented); (c) thinkers/feelers, and (d) judgers/perceivers (Felder, 1996).

Information processing models such as the Kolb Model of Experiential Learning (1978) classified students in two basic dimensions: (a) concrete experience (CE) or abstract conceptualization (AC) and (b) active experimentations (AE) or reflective observation (RO). Using this model, students were classified into one of four types based on how they perceived information (CE/AC) and how they learn information (AE/RO). This theory stated that students used any of the four styles some of the time by claiming that the classification was a preferred method, not an exclusive one. Kolb's Learning Style Inventory (LSI) categorized students according to this model (Willcoxson &

Prosser, 1996). A more recent version of the LSI was titled the LSI-IIa (Smith & Kolb, 1996).

Gregorc's (1982) model was similar to Kolb's, except that the two dimensions rated perception from abstract to concrete and ordering from sequential to random. The classification of the learner was one of four states, again similar to Kolb, using the Gregorc Style Delineator. Honey and Mumford (1986, 1992) developed their learning styles questionnaire as a variation of Kolb's model. The four learning styles were activist (immediate experiences, here and now), reflector (observer of experiences, analyzes thoroughly), theorist (logical approach), and pragmatist (practical approach, problem-solver).

The Grasha-Reichmann Model (Reichmann & Grasha, 1974) focused on the social interaction aspect of students' responses toward learning, classroom procedures, and faculty/peer interaction. The three bipolar dimensions included (a) independent-dependent, those who preferred working alone, were confident and self-directed versus those who preferred an authority figure to provide guidance; (b) collaborative-competitive, those who enjoyed working cooperatively with others versus those who competed with their peers; and (c) participant-avoidant, those who took part in learning activities and classroom interactions versus those who demonstrated little interaction (Partridge, 1983).

Fleming and Mills (1992) suggested four categories that reflect the experiences of the students. The acronym VARK stands for the categories that were as follows: Visual (V), Auditory (A), Read/write (R), and Kinesthetic (K). The VARK questions and results focused on the ways in which people like information to come to them and the ways in

which they liked to deliver their communication. Questions were based on situations where there were choices and decisions about how that communication might take place. Fleming and Mills' VARK tool was suggested by the NLN's Certified Nurse Educator Preparation Workshops and Examination Information as one way nurse educators could examine learning styles (NLN, 2008).

Instructional preference theories were reported by Canfield (1980) and Dunn and Dunn (1978). The Canfield Model (1980) was based on four learner scales: (a) conditions of learning (affiliations and orientation toward goals); (b) content (numbers and language); (c) mode (preference for listening, reading, direct experience); and (d) expectation (expected grade). Dunn, Dunn, and Price's Learning Style Model (1993, 1996) was multidimensional and took into account environmental, emotional, sociological, perceptual, physiological, and psychological elements. Environmental preferences included sound, light, temperature, and class design. Emotional preferences encompassed motivation, persistence, responsibility, and structure. The sociological preference addressed learning alone or in groups, as well as learning relationships. A physiological preference element contained perceptions, time, and mobility. The final element identified psychological preferences by global and analytic learning styles based on hemisphericity (O'Connor, 2008).

The Dunn, Dunn, and Price Productivity Environmental Preference Survey (PEPS; Dunn et al., 1986) provided information about patterns through which learning occurs, not why the patterns exist (Billings, 1991). The theory underpinning development of the PEPS was that students possessed biologically based physical and environmental learning preferences that, along with well-established trait-like emotional

and sociological preferences, combined to form an individual learning style profile. A student's learning style was thus claimed to be largely resistant to change (Dunn, 1991).

An adaptation of the PEPS (Dunn et al., 1986) was created by the ATI (ATI, 2000). ATI developed a SAI to help a student assess his or her own personal characteristics and attitudes as they related to qualities of a successful nursing candidate. The SAI was composed of a number of subscales designed to measure the individual in four areas: critical thinking, learning styles, professional characteristics, and work values. Learning styles content area had a subscale with factors such as physical (visual, auditory, tactile) and sociological (individual and group) that paralleled the PEPS elements.

Learning Styles Instruments

Learning styles instruments that were used in the literature included Grasha-Reichmann Student Learning Style Scales (Aragon et al., 2002; Diaz & Cartnal, 1999); Kolb Learning Styles Inventory (Aragon et al., 2002; DiBartola, Miller, & Turley, 2001; Fahy & Ally, 2005; Harris, Dwyer, & Leeming, 2003; Hauer, Straub, & Wolf, 2005; Laschinger & Boss, 1989; Suliman, 2006; Terrell, 2002); and the Myers-Briggs Type Indicator (Salter, Evans, & Forney, 2006). Other studies utilized the Gregorc Learning Styles Delineator (Ames, 2003; Butler & Pinto-Zipp, 2005); GEFT (Akdemir & Koszalka, 2008; Shih & Gamon, 2001); Honey and Mumford's (1992) Learning Styles Questionnaire (Klein, McCall, Austin, & Piterman, 2007; Rassool & Rawaf, 2007); and an adapted version of Honey and Mumford's instrument (Charlesworth, 2008).

Additional learning styles instruments included Canfield's Learning Style Inventory (Keri, 2002; Liu, 2007); the VAK Survey of Preferred Learning Channels Tool

(Fearing & Riley, 2005); Fleming's (2007) VARK Questionnaire (Slater et al., 2007; Wehrwein, Lujan, & DiCarlo, 2007); and the Index of Learning Styles Inventory (Choi et al., 2008; Cook, Gelula, Dupras, & Schwartz, 2007; Johnson & Johnson, 2006). Several studies used the PEPS (Billings, 1994; Billings & Cobb, 1992; Harrelson, Leaver-Dunn, & Wright, 1998; LaMothe et al., 1991; Murray-Harvey, 1994; Reese & Dunn, 2007; Skinner, 1995) and the Rundle and Dunn (2000) Building Excellence Survey (Honigsfeld & Schiering, 2004; Morton-Rias et al., 2007). Linares (1999) used the Marshall and Merritt's (1986) Learning Style Questionnaire. A few researchers developed their own learning style instrument (Andrusyszyn, Cragg, & Humbert, 2001; Carlson, Ivnik, Dierkhising, O'Byrne, & Vickers, 2006) and a combination created of Kolb's and Canfield's Learning Styles Inventory (Merritt, 1983).

Two studies established the reliability and validity of the Dunn, Dunn, and Price PEPS with baccalaureate nursing students (LaMothe et al., 1991; Murray-Harvey, 1994). Bremner, Aduddell, and Amason (2008) utilized the SAI from ATI to measure students' learning style and coping styles.

Characteristics of Learning Styles

Flexibility. Learning style may depend on the context in which it operates. For example, environmental factors such as interaction with instructor and peers, general atmosphere of the classroom, class size, and diverse backgrounds may influence learning style. It may be possible that individual characteristics are not stable and therefore learning styles may change. As Bandura (1986) explained with his theory of reciprocal determinism, the environment affects behavior, which may influence learning performance. It may be that the most successful learners are those that are more flexible

with style (Kane, 1984). Several studies supported the concept of flexibility such as Diaz and Cartnal (1999) who stated that learning preferences were likely to change as one matured and encountered new educational experiences. Terrell (2002) concluded that students simply did not let their preferred learning style interfere with their desire to complete the graduate degree program. Ames (2003) found that 68% of the participants exhibited an ability to move from one learning style to another. Honigsfeld and Schiering's (2004) results indicated students either had no preference for a particular learning style element or demonstrated flexibility regarding the presence or absence of the element.

As stated in the Fearing and Riley (2005) article, "Learning style preferences change with age, experience, and maturity, it makes sense that the activities designed to engage various learning styles in a traditional undergraduate course would be different from those designed to engage adult learners" (Palloff & Pratt, 2003, p. 34). Therefore, Fearing and Riley recommended that educators assess students' preferred learning styles prior to the beginning of the program and evaluate learning style changes (flexibility) at the end of the program. Liu (2007) concluded that online students' preferred learning styles tended to change from the beginning of the semester to the end of the semester. Hauer et al. (2005) recommended that learning styles be assessed at various stages to determine if they stay consistent or if they change.

Stability. Some research implied that individuals have a certain learning style that prevails over time. Although learners may develop strategies to complement their style, overall thinking and organizing was dominated by a specific style (Thompson & Crutchlow, 1993). Learning style defined as the cognitive, affective, and psychological

traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Keefe, 1979) was adopted in a few studies. This definition related learning style as individual, stable, and predictable. Several studies utilized the PEPS instrument, which claimed to be measuring stable, inherent characteristics of an individual (Dunn et al., 1986). However, Murray-Harvey (1994) reported poor test-retest reliability data with the PEPS over an interval of one year indicating a lack of stability.

Salter and associates (2006) demonstrated that over a two-year period learning styles tended to be relatively stable among graduate students in student affairs administration. Their results supported the supposition that trait-based learning style preferences were relatively stable over time. However, they recommended longer spans of time to collect data in order to better address the assumption of stability.

Match. One theory advocated by researchers was that the level of achievement would be optimized when the student's learning style was matched with a similar teaching style. However, research in this area also was clouded by inconsistent findings. Lovelace (2005) conducted a quantitative synthesis of 76 experimental research investigations between 1980 and 2000 in which the Dunn and Dunn Learning Styles Model (1993, 1996) was used. The author suggested that learning style responsive instruction increased the achievement or improved attitudes toward learning, or both, of all students. Results overwhelmingly supported the position that matching students' learning style preferences with complementary instruction methods improved academic achievement and student attitudes toward learning.

Choi et al. (2008) concurred that it was important to redesign teaching methods based on learners' preferred styles so that the learning outcome would be maximized. A significant effect was found on students' level of achievement when the students' learning styles were matched with a similar teaching method (Slater et al., 2007). This was not supported by Akdemir and Koszalka (2008) who found that matches between students' learning styles and instructional strategies did not affect the learners' perception of their learning achievement, level of effort and involvement, and level of interactions in the course. On the other hand, highly motivated students succeeded whether or not the method used matched their learning preferences (Andrusyszyn et al., 2001).

Most educators would agree that one goal of education would be to help students develop and become lifelong learners. The concept of matching styles implied that individuals would be static, which potentially contradicted the purpose of education. Matching the teaching style to the student's learning style may hinder the student's ability to function when presented with alternate situations (Thompson & Crutchlow, 1993).

When instruction methods matched students' learning style preferences, the students achieved higher scores than when mismatched. Student examination scores and student's attitude toward learning scores were significantly higher when presentation was matched with student learning styles (Slater et al., 2007). But should students use only their matched preferred learning style and risk becoming rigid and unable to learn differently? Mismatching is suggested as an occasional teaching strategy employed to stimulate interest, and not as an alternative or replacement for matching. Whether the reasoning for using multiple styles of delivery was to match students' learning style or to

offer a combination of preferred/mismatched styles to hold attention and stretch the student, an instructor who varied teaching approaches was more likely to meet student needs.

Mismatch. Contrary to the belief of matching learning style with teaching methods, mismatching would mean students needed to experience some discomfort in order to grow. An environment that was too harmonious may not challenge the student to grow. The concept of creating some discomfort in the student's environment by mismatching styles should be given serious consideration. Assignments should not always be consistent with the student's learning style, but be designed in a manner that enables the student to expand those capabilities. Students should develop their least preferred learning style to maximize their academic potential (Diaz & Cartnal, 1999; Linares, 1999). Strengthening less preferred learning styles helped students to expand the scope of their learning, become more versatile learners, and adapt to the real world (Sarasin, 1998). However, over challenging students may result in attrition from the program. Fahy and Ally (2005) concluded that if students were not permitted to use their individual learning styles, mismatched requirements by faculty may become a potential barrier to learning. In some instances, a mismatch between teaching style and learning style of students would have serious consequences. Students tended to be uninterested, performed poorly on tests, and became discouraged about the course (Rassool & Rawaf, 2007).

A few of the research studies found no difference for the student if the learning style was matched or mismatched. Keri (2002) found that when student learning style and instructor teaching style matched, students did not feel more satisfied in their classes

than those students who were mismatched. Engaging students with different learning styles in different types of instructional strategies that either match or mismatch their preference did not prompt any difference in perceived learning engagement (Akdemir & Koszalka, 2008). There was no difference in learning for students when questions were matched or mismatched to learning style (Cook et al., 2007).

One of the NLN's Hallmark of Excellence in Nursing Education is for students to be excited about learning and exhibit a commitment to lifelong learning (Ironside & Valiga, 2006). Current students need to be empowered to be efficient lifelong learners, remain marketable and constantly broaden their knowledge and skills. This knowledge may involve becoming receptive to different methods of learning, moving from a comfort zone of passive learner to a more active learner. Jordanov (2001) reported students with a preference for an active learning style had a positive relationship with attitudes toward and performance on computer tasks. Lifelong learning is the only answer for a competitive future (NLN, 2005a).

The AACN (1999) endeavored to define the parameters of the scholarship of teaching to include development of educational environments that embrace diverse learning styles. Teaching, learning, and evaluation strategies should be innovative and varied to enhance learning by a diverse student population (Ironside & Valiga, 2006). As much as embracing learning styles is a catalyst capable of igniting change, it also can be inhibited if nurse educators fail to evaluate diverse learning styles. According to Emerson and Records (2008), curricular development, student advisement, and learning environments that influence teaching and learning are notably absent. The rigorous design and conduct of studies that test how best to facilitate student learning should

receive attention within an academic institution in the same way that successful clinical research is acknowledged (Emerson & Records, 2008; U.S. Department of Education, 2008).

Attempts to increase diversity within the nursing profession have resulted in the admission of more ethnically diverse students into nursing education programs. Changes in pedagogical practice that represent a variety of cultural contexts should be made so that the learning styles of all learners are addressed (Giddens, 2008). In order to address the diversity of current students, the need to increase retention and success of each student, and the need for students to be empowered to be efficient lifelong learners, an understanding of individual learning styles in the current student population is important. The existing literature was plentiful with research addressing what type of learning styles traditional students have. Less research has been reported regarding the learning styles of nontraditional students, particularly accelerated nursing students. No studies in this review of the literature indicated whether any student or student group was given information about their learning style.

Overall, the validity of most findings were jeopardized by several methodological deficiencies including lack of a clear and consistent definition of learning styles, the use of small study samples, and limited research designs. As a result, inconsistency existed in the findings of the studies reviewed.

Independent Variables

Demographic Variables

Age. Learning style preferences changed with age, experience, and maturity. Therefore, it made sense that the activities designed to engage various learning styles in a traditional undergraduate course would be different from those designed for graduate courses (Palloff & Pratt, 2003). Harrelson, Leaver-Dunn, and Wright (1998) reported younger students preferred studying or working with peers in the evening while older students preferred to study or work alone during the morning. First-semester juniors preferred more structure and greater authority than did senior nursing students. There was a difference between first and second year students in preferences for afternoon learning with first year students preferring afternoon.

There was no significant relationship between learning styles and age (Edwards, 2005; Linares, 1999; Merritt, 1983) which conflicted with the findings of Morton-Rias et al. (2007) who reported age-related learning style differences. LaMothe et al. (1991) reported that the youngest and oldest baccalaureate nursing students preferred structure. *Generation Y* students with birth years 1980 through 2001 have now joined the existing workforce of nurses. Generation Y are a globally aware and racially diverse generation. These learners were accustomed to structured learning environments and considerable technology especially online learning. However, it was reported that they were not attentive and disliked having to sit and read (Lower, 2008; Pardue & Morgan, 2008). These learners demonstrated a multitude of learning styles that were not supported by traditional higher educational pedagogies (Pardue & Morgan, 2008). Generation Y-ers

were visual learners so the use of concept mapping accommodated and enhanced learning for these nursing students (Arhin & Cormier, 2007).

As mature age individuals return to higher education, students continued to represent multiple generations. Each generation had its own set of values, ethics, beliefs, and learning styles. Developing knowledge of different learning styles among the student population is important in designing curricula and promoting the learning skills needed for lifelong learning (Meehan-Andrews, 2009).

Gender. Gender influenced educational outcomes. LaMothe et al. (1991) when studying differences between baccalaureate nursing students using the PEPS instrument found men had a higher preference for afternoon and evenings whereas women preferred mornings. Men also preferred more authority than women.

Reese and Dunn (2007) reported males indicated a stronger need for learning with an authority figure, were more visual learners and required structure and mobility. Men preferred afternoon learning. Female students preferred bright light, warm temperatures, formal seating, motivation, learning alone or with peers, eating while concentrating, and a variety of instructional approaches. Females preferred late morning learning. Morton-Rias et al. (2007) reported women more than men preferred warm learning environments, learning with an authority figure present, learning independently or in pairs as opposed to 33% of men who preferred learning in small groups. Harrelson et al. (1998) reported light preferences for male and female students with females preferring more light.

Ames (2003) reported that females are more likely to have learning styles that are not compatible with technology-oriented curriculum therefore computer facilitated

instruction may be ineffective. Wehrwein et al. (2007) reported that females preferred unimodal learning with preference for kinesthetic activities while males preferred multimodal learning and were evenly distributed amongst auditory, reading/writing and kinesthetic activities. However, Slater et al. (2007) found over one half of the subjects' preferred multimodal learning yet the modality combinations were not statistically significant. They also stated females may have a broader range of learning preferences than males. No significant relationship between learning styles and gender (Fahy & Ally, 2005) was supported by Edwards (2005) that found no significant difference between gender, age and course grades.

Race/ethnicity. While LaMothe et al. (1991) found no significant difference in learning styles by race, Charlesworth (2008) did between the Eastern and French cultures. Eastern cultures preferred time to plan and held an attitude of respect for authority figures while these characteristics carried little importance for the French.

Noble, Miller, and Heckman (2008) utilized the Witkin's GEFT to measure the learning style of traditional and nontraditional nursing students. Findings revealed that race/ethnicity was a predictor of performance on the GEFT. Nursing students classified as *White* scored 1.11 points more on the GEFT mean score while being *Asian* yielded a GEFT mean score 0.04 points lower.

Zhang and Lambert (2008) suggested that Chinese baccalaureate nursing students preferred to learn by reflective observation and are visual learners as a much of the nursing education in China is taught by observation. Self-confidence was found to be positively correlated with visual learning.

Dependents. Dependents included whether students are a care provider for dependent(s) or not. Jeffreys (2007) stated that environmental factors are more important for nontraditional students than academic factors. Environmental factors are factors external to the academic process that may influence students' academic performance and retention (Metzner, 1989). These range from financial, family support, family responsibilities, child and elder care, family crisis, work hours and responsibilities, living arrangements and transportation (Jeffreys, 2004). In programs with high numbers of adult students, there may be a larger number of students who leave the program because of caring for dependents or job-related issues (Sauter, Johnson, & Gillespie, 2009).

Employment and type of work experience

In the clinical arena, Sutcliffe (1993) investigated whether registered nurses' preferred learning styles, defined in this study as type of teaching method, varied according to subject area. The researcher noted that there was a change in learning style (preferred teaching method) when different subjects were studied. Skinner (1995) found a significant relationship between learning style and job satisfaction among nurses practicing in acute medical-surgical care setting.

Lin et al. (1993) studied identification of an educational approach that accommodates oncology nurses' professional and personal learning styles. A clinical educational program was implemented to meet the varied learning needs of oncology nurses. When the individual learning needs of oncology nurses were met, the nurses demonstrated improved assessment scores, increased participation and collaboration in patient care, and verbalized feelings of empowerment.

In clinical studies, Carlson et al. (2006) reported that the patients with chronic obstructive pulmonary disease preferred *manner of learning* was face-to-face with *someone who knows*. Learning via the Internet was ineffective and the least preferred learning style.

Hours per week work for pay. Andrusyszyn et al. (2001) found that the more hours the students in RN to BSN completion programs worked, the more they preferred to study alone and if working 9–16 hours, preferred less structure in the learning environment. Work hours per week were not associated with their Web-based academic achievement regardless of student learning styles (Shih & Gamon, 2001). Length of employment did not account for differences in the way four year nursing students or RN to BSN students prefer to learn (Merritt, 1983).

Academic Variables

GPA/Academic Achievement. Billings and Cobb (1992) found no significant differences on learning style preferences and GPA on learner achievement when using computer assisted interactive videodisc instruction between traditional and nontraditional RN to BSN students. Similar to Billings and Cobb (1992), learning style did not alter academic achievement whether in the traditional classroom or the online learning environment (Akdemir & Koszalka, 2008; Aragon et al., 2002; Billings, 1994; Cook et al., 2007; DiBartola et al., 2001; Johnson & Johnson, 2006; Linares, 1999; Liu, 2007; Shih & Gamon 2001). Students' learning styles and use of online course modules, whether basic or multimedia modules, did not impact students' academic achievement (Harris et al., 2003). Web-based course format offered sufficient variety for all students to be successful academically despite their preferred learning styles (Fearing & Riley,

2005). The relationship between individual learning style and completion rate was not significant (Terrell, 2002).

Students with a higher GPA were more motivated and responsible (Billings & Cobb, 1992). These findings were supported by Shih and Gamon (2001) and Aragon et al. (2002) who reported motivation as a significant factor in Web-based learning as evidenced by student achievement but conflicted with Edwards (2005) who reported that gender, age, motivation, and learning style were not significantly related to academic achievement. Reese and Dunn (2007) reported students with *highest* GPA preferred either learning alone or with an authority figure, in the late morning or afternoon. Students with *high but not highest* GPA had strong preferences for bright light and formal seating.

DiBartola et al. (2001) reported a correlation between above-average grades in the online environment of Diverger (Kolb, 1984) students. Terrell (2002) found that 87.1% of Convergers and Assimilators (Kolb, 1984) completed the course however, Harris et al. (2003) found learning style and the online environment had no impact on mean test scores. Akdemir and Koszalka (2008) found matching instructional strategies and learning style was not significant for academic achievement.

Students who failed one or more prerequisite courses scored significantly lower on motivation (LaMothe et al., 1991). Two other studies also noted significant differences in motivation (Morton-Rias et al., 2007; Reese & Dunn, 2007). There were no significant differences between learning style and student satisfaction even though ACT scores were significantly related to student satisfaction (Keri, 2002).

Kostovich, Poradzisz, Wood, and O'Brien (2007) examined the relationship between undergraduate nursing students' learning style preferences and aptitude for concept maps. They found no significant differences between learning style preference and concept map grades which is similar to Ramprogus' (1988) findings.

Ravert (2008) examined the moderating effect of nursing students' preferred learning style in achievement when a patient simulator is used. The researcher found that students who prefer an experiential approach, such as patient simulation experiences, may improve their critical thinking more than those who prefer a reflective approach utilizing discussion groups. Learning style did not account for the increase in critical thinking skill scores, therefore it was not a moderating factor in this small sample of students.

Type of BSN program. In the literature, there were differences in the type of BSN program in which students were enrolled. The four-year BSN students were often referred to as *traditional* students who may have recently graduated from high school with no prior college credits completed and are enrolled in a four-year nursing program. Accelerated BSN students were those enrolled in a compressed or *fast track* plan of study ending in a baccalaureate degree in nursing. This student would have previous college experience and now is in an accelerated course of study in nursing. Accelerated students have been referred to as *nontraditional* students in the literature.

Merritt (1983) examined the relationship between traditional and nontraditional students based on age and employment experience. The nontraditional students were less positively oriented toward the learning environment and methods used in formal settings than traditional students. Traditional and nontraditional students prefer structured

environments within which course expectations and requirements are clearly defined and content presented in logical manner; nontraditional students prefer instructional methods that include both passive and active while traditional students prefer to be actively involved. Nontraditional students were not oriented toward instructional situations that promote positive relationships with the instructor and peers while traditional students prefer this.

Nontraditional and traditional students tended not to prefer learning environments that are competitive and teacher-controlled. Nontraditional students tended not to prefer reading modes but were more positive about reading than traditional students. LaMothe et al. (1991) also found nontraditional and traditional students preferred structured learning environments and that RN students preferred more mobility than traditional students. Honigsfeld & Schiering (2004) reported teacher candidates also preferred structured learning environment. Billings and Cobb (1992) reported traditional students preferred to study in bright light.

Significant differences were found between the learning styles of online learners who were more independent and less collaborative than on-campus learners (Diaz & Cartnal, 1999). Liu (2007) reported online students had a higher preference for learning and working independently, a competitive online environment, instructor's help, direct hands on experience, and clear goal setting as opposed to their face-to-face peers. As opposed to a single learning style, Butler and Pinto-Zipp (2005) reported that a dual learning style was the dominant learning style in their online study.

The learning styles of the RN students in an online program were similar to the BSN students in traditional classroom settings (Smith, 2010). Convenience of online

delivery was of greater importance to students than their preferred learning style. Students were most positive about the convenience of Web-based instruction (Shih & Gamon, 2001), and convenience, time management, and interaction within the online course (Butler & Pinto-Zipp, 2005; Fearing & Riley, 2005).

Learning style was not found to be significantly related to preferred method of learning nursing theories. Nontraditional students preferred lectures by experts while traditional students preferred clinical applications to learn nursing theory (Laschinger & Boss, 1989).

Linares (1999) determined that Converger was the predominant learning style for traditional and RN nursing students. Convergers were significantly more self-directed than the other subjects with Kolb (1984) learning styles.

Rassool and Rawaf (2007) reported the predominant learning style for diploma and baccalaureate undergraduate nursing students was the Reflector (observer of experiences; analyzes thoroughly), and 30% were noted to have a dual learning style, meaning they scored high on two different learning style categories which was similar to Butler and Pinto-Zipp (2005) in the online studies.

Bremner, Aduddell, and Amason (2008) reported no significance of first year baccalaureate nursing students' learning styles, coping, and anxiety related to a human patient simulator experience. The ATI SAI was used to measure students' learning style. In this study, the majority of the students preferred visual and tactile learning and were group learners lending themselves to simulation experiences. Fountain and Alfred (2009) found positive relationships between learning styles and student satisfaction with simulation.

Years of education. Large numbers of college graduates are seeking second careers and responding to the continuing demand for nurses that result from the persistent nursing shortage (Walker, Tilley, Lockwood, & Walker, 2008). Suliman (2006) reported that the majority of students in the accelerated (second degree) nursing program evidenced a different learning style than the majority of students in the traditional program. Students in the accelerated program were mostly Kolb's (1978) Convergers which relied on thinking and demonstrating, while the traditional students were Divergers and relied on watching and feeling. Students in the accelerated program were significantly better critical thinkers than the traditional students whose critical thinking appeared inadequate.

Learning style preferences. Assessment of individual learning style preferences was measured by various learning styles instruments as noted above. For this study, the type of learning style preferences was reported by the ATI SAI (ATI, 2000) results. The SAI was developed to assess a student's own personal attributes and attitudes as they relate to qualities of successful nursing candidates. It is a Likert-type assessment designed for administration to adult nursing program populations at the beginning of program coursework in nursing. The examination format was 195, five-option, items which indicated strongly agree to strongly disagree level of agreement. The assessment was designed to give the nursing student insight into personal characteristics. There were no right or wrong answers. Administration of the test was individual or group and was either paper or pencil or Web-based. For security precautions in the Web-based administration, items were randomly scrambled. If Web-based, the student's results would be electronically available on an individual

performance profile. The time limit for the SAI was three hours, completed in one session.

The SAI was composed of four content areas designed to assess an individual's critical thinking, learning styles, professional characteristics, and work values. Learning styles was defined by the SAI as the modality by which an individual synthesized, assimilated or internalized information. The Learning Styles subscale consisted of 45 assessment items divided as follows: (a) Visual (n = 8), (b) Auditory (n = 7), (c) Tactile (n = 9), (d) Individual (n = 11), and (e) Group (n = 10). The physical (Visual, Auditory, and Tactile) and sociological (Individual and Group) elements of the PEPS (Dunn et al., 1986) were paralleled in these five learning styles subscales (ATI, 2000).

Visual styles were characterized by an optic or visual stimulus such as the written work, pictures, graphs, diagrams, or mental visualizations as the basis for synthesis of information. The auditory style was characterized by the use of hearing as the primary stimulus, which incorporated sound and was exemplified by verbal repetition, tapes, lectures, and auditory memory. Tactile styles were perceived through touch; this style of learning typically used manipulation of an object(s) to internalize information into long-term memory (ATI, 2000).

Individual preference was defined by the SAI as a learner who feels most comfortable if he or she had control of the depth, rate and breadth of the personal learning environment. This learner was an independent learner with an inability to rely on others in an academic setting. Group preference indicated that a learner thrived in a group setting, was stimulated by others and in a cooperative activity was able to glean information from those around the learner (ATI, 2000).

The SAI had been reviewed by content experts and evaluated for relevance and content validity of material to the identified constructs (ATI, 2000). Psychometric properties were based on data collected from 8,204 students at 187 different nursing programs. The development of the SAI scales was driven by the responses to assessment items by a panel of content experts. The reliability of the overall inventory was found to be 0.9144 using coefficient alpha (ATI, 2000).

Gaps in the Literature

As noted in the review of literature, the purpose of many studies was simply identification of student learning style preferences. Learning style preferences were related to demographic variables such as age, gender, race/ethnicity, dependents, employment, type of work experience, and hours per week working for pay. Academic variables such as GPA, type of program enrolled, and years of education where also related to learning styles. There was no comparable study found that examined baccalaureate nursing students' ability to explain their learning style preference information or their intent to use their learning style preference information.

Very few studies discussed whether student(s) had or had not been informed of their learning style preference(s) after they have been assessed with a learning style instrument. Yet, Johnson (2007) stated that at the college level, students are aware of their learning style preferences and understand the conditions that facilitate their mastery of course content. It was not clear as to how that statement was supported.

Rundle and Dunn (2007) reported that several colleges and universities identified the learning style preferences of every entering freshman and provided seminars on how to capitalize on the information. This knowledge was seen as particularly valuable for

at-risk students and the professors in whose classes they were enrolled. At the completion of those seminars, student evaluations reflected their increased self-awareness and improved study skills. As a result of the impact on freshmen, administrators conducted college-wide information sessions and professional development seminars for faculty to increase their understanding of learning style preferences (Dunn, Honigsfeld, & Doolan, 2009). College students acknowledged that discovering their learning style preferences assisted them in becoming better learners and increased their self-efficacy (Dunn et al., 2009). The majority of students described having some knowledge of their learning style preferences but were never asked to explain it.

Noble et al. (2008) studied the cognitive style of traditional and nontraditional nursing students. They report that, "Understanding of students own field preference may assist the students in selecting the environments or strategies that best suit their own cognitive style and optimize learning" (p. 246). The idea of training students to recognize their own learning style preferences and possibly to modify their approach to learning has critical implications for developing nursing curricula. When students become aware of their own learning style preferences and its implications about learning, students will be better able to select optimal instructional strategies in the classroom and clinical learning environments.

If students were not informed of their learning style preferences, it would not be feasible for them to explain what their learning style preference information means for their individual success. Further, if students were not informed and have no ability to explain their learning style preference information, their intent to use learning style preference information would be lacking.

Summary

Learning style was not without its critics. Conflicting results were common in the learning style research yet there were some conclusions that can be drawn from the literature review. Overall, learners were equally successful in the traditional face-to-face and online environment regardless of learning style preferences. For some studies, learning outcome was not altered by the learning style preferences whether in the traditional classroom or distance environment (Aragon et al., 2002; DiBartola et al., 2001; Harris et al., 2003). Several found no significant relationship between learning style preferences and achievement (Billings & Cobb, 1992; Cook et al., 2007; Edwards, 2005; Harris et al., 2003; Johnson & Johnson, 2006).

No single approach to instructional delivery was superior for all students or all content; therefore, it is recommended to offer options for instructional strategies (Akdemir & Koszalka, 2008; Andrusyszyn et al., 2001; Johnson & Johnson, 2006; LaMothe et al., 1991; Linares, 1999; Meehan-Andrews, 2009; Merritt, 1983). Different teaching-learning activities should be developed for students (Harrelson et al., 1998; Merritt, 1983), and nontraditional students need assistance in understanding what are the expected learning behaviors (Merritt, 1983). When possible, faculty should allow student choice of method. Designing and offering several delivery methods acknowledged students' diverse preferences and would enhance the learning experience while supporting academic achievement (Andrusyszyn et al., 2001; Choi et al., 2008; Honigsfeld & Schiering, 2004; Johnson & Johnson, 2006; Meehan-Andrews, 2009). Engaging students who have different learning style preferences with different types of instructional strategies that either match or mismatch their preference does not prompt

any difference in learner engagement (Akdemir & Koszalka, 2008). Technology allowed faculty to create learning environments that appeal to a variety of learning style preferences (DiBartola et al., 2001).

The current undergraduate nursing student population is very diverse. These students range in age, work and educational experiences, culture, level of preparedness, and learning style preferences (Meehan-Andrews, 2009). At-risk students should be assisted early in their academic career (LaMothe et al., 1991). Students' ability to explain their learning style preferences should enhance learning for those who are underperforming in their academic studies. Those who are at-risk may be provided with individual tutorials where tailor-made supplementary learning materials would be devised and initiated (Rassool & Rawaf, 2007). Educators need to have an understanding of learning style differences so they can approach teaching differently with diverse cultural groups (Charlesworth, 2008). Administrators and instructors should plan appropriately when scheduling and teaching diverse students (Reese & Dunn, 2007).

Educators should know their own learning style preferences (Aragon et al., 2002; Rassool & Rawaf, 2007) and should assist students to understand their own learning style (Billings, 1994; LaMothe et al., 1991). To facilitate a match between learning style and students, nurse educators need to discuss with students how to approach subject material and plan the session together (Sutcliffe, 1993). Students expressed appreciation for the opportunity to discover how they learn and doing so may improve student retention (Morton-Rias et al., 2007). This information would guide students toward doing their homework with strategies responsive to their styles (Reese & Dunn, 2007). The value of learning styles as a predictor of attrition may be important (Terrell, 2002). Instructional

strategies should be adapted to learner needs, to design alternative curricula, to help individuals select courses compatible with their learning styles, and to help reduce dropout rate (Liu, 2007). For example, planning small student-faculty ratios for male students who tended to prefer studying with an authority figure (faculty) present (LaMothe et al., 1991).

Clinical nurse educators should educate their staff and patients on their learning styles (Joint Commission on Accreditation of Healthcare Organizations, 2008; Skinner, 1995). Knowledge of learning styles in the workplace would facilitate team work, daily assignments, and communication utilized by clinical staff members (Skinner, 1995). Learning styles may also impact the effectiveness of interdisciplinary team interactions and the patient educational process in the clinical arena (Hauer et al., 2005). Usefulness of this knowledge would be extended to the various learning styles of patients that nurses care for and teach (Skinner, 1995). Carlson et al. (2006) concluded that each patient may have a unique preference for the manner in which to receive education and would appreciate matched instructional methods.

Throughout the literature, undergraduate nursing students' learning style preferences and their impact on the educational process were emphasized. Differences reported in the independent variables were of interest for this research proposal. Based on the literature review, gaps in the learning style literature were determined.

Chapter Three discusses the methodology used to examine the relationship between the demographic, academic, and ATI SAI information variables; and ability to explain learning style preference information with the intent to use learning style preference information by baccalaureate nursing students.

CHAPTER THREE

METHODOLOGY

The purpose of this study was to examine the relationship between the independent variables (demographic variables: age, gender, race/ethnicity, number of dependents, number of hours per week care of dependents, current employment, type of work experience, and hours per week work for pay; academic variables: GPA, type of BSN program, and years of education; ATI SAI information variables: when taken, who shared results, how results received, if read results, what information reported, type of learning style preferences, understanding of results, and usefulness of learning style assessment; and ability to explain learning style preferences) and the intent to use learning style preference information by baccalaureate nursing students. A researcher-developed instrument was designed to measure the demographic, academic, ATI SAI information and ability to explain variables in the conceptual model of the study (Figure 1) and was used with the ATI SAI that measured the learning style preference variables (visual, auditory, or tactile learner; group or individual learner). Students self-reported the type of learning style preferences that they scored highest on from the ATI SAI administered by the nursing program. This chapter describes the design, setting and sample for the study, and discusses the instrument development, and concludes with information about data collection processes and analyses.

Research Question

Among current students enrolled in undergraduate baccalaureate nursing programs, which variables (demographic variables: age, gender, race/ethnicity, number of dependents, number of hours per week care of dependents, current employment, type of

work experience, and hours per week work for pay; academic variables: GPA, type of BSN program, and years of education; ATI SAI information variables: when taken, who shared results, how results received, read results, what information reported, type of learning style preferences, understanding of results, and usefulness of learning style assessment; and ability to explain learning style preferences) are significantly related to student intent to use learning style preference information?

Design, Setting, and Sample

Design

For this study, a nonexperimental, descriptive, ex-post facto design was used to examine the demographic, academic, ATI SAI information variables, ability to explain learning style preferences of the undergraduate baccalaureate nursing students as related to their intent to use learning style preference information. This was assessed by administration of the *Intent to Use Learning Style Preference Information Survey* (Appendix A). Questions were designed to investigate the study variables. There was no manipulative control of the variables.

Setting

The setting for the study was undergraduate baccalaureate nursing programs in varied geographical regions. Nursing programs were selected only if they administered one commonly used commercially available inventory, the ATI SAI, to their baccalaureate nursing students and informed them of their assessment results.

Random selection of the nursing program by region, as recognized by the Council for Higher Education Accreditation, took place (Council for Higher Education, 2009). Programs that did not respond or declined participation were eliminated and the

remaining programs selected randomly from that region. Programs were identified by networking with colleagues in various settings and by Internet discussion lists. Directors, deans, or department chairs of undergraduate baccalaureate nursing programs were contacted by the researcher for permission to participate in this study if they used the ATI SAI.

Sample

A purposive convenience sample was drawn from undergraduate baccalaureate nursing programs across the nation in order to achieve broad representation. Students who were enrolled in the baccalaureate program and completed the ATI SAI were recruited for the research study. Eligibility criteria for study recruitment included students (a) who were enrolled in a baccalaureate program, (b) who had completed the ATI SAI, and (c) who had been informed of their SAI scores. Students were excluded from the study if they (a) were not enrolled in a BSN program, (b) had not taken the ATI SAI, or (c) had not been informed of their SAI results. Students were in the beginning phase of their nursing program.

The sample size for this research study was calculated based on multiple regression procedures to analyze data. Based on a selected power of .80 and alpha of .05, the sample size of 210 subjects is needed to eliminate subject variance and provide adequate power (Tabachnick & Fidell, 2001). The Tailored Design Method (Dillman, 2007) was used for recruitment of subjects to maximize participant response rate.

Instruments

ATI Self Assessment Inventory (SAI)

For this study, students' self-reported their type of learning style preferences that had been measured by the ATI SAI (ATI, 2000). Many schools of nursing administer commercial inventories to their students to obtain baseline information about the learning needs of their students in areas of critical thinking, personality and professional characteristics, and learning style preferences in order to identify student needs and plan programs to increase retention and success of each student. The ATI SAI was one of several popular commercial tools that measured, among other variables, learning style preferences. Students received information indicating whether they were a visual, auditory, tactile, group, or individual learner. While the reliability and validity for this instrument was average, the SAI assesses learning styles in a way that is easy for students to understand and use. It was therefore selected for this study.

The SAI is a Likert-type assessment designed for administration to adult nursing program populations at the beginning of program coursework in nursing. The examination format is 195 five-option items indicating strongly agree to strongly disagree level of agreement. Administration of the test could be individual or group and either paper or pencil or Web-based. For security precautions in the Web-based administration, items are randomly scrambled by ATI. The time limit for the SAI was three hours, completed in one session. After completion of the online assessment, students automatically obtain a computer-generated print-out of their individual results. The SAI also provided an individual or aggregate data report immediately to the administrator. Results could be easily shared with student(s), faculty and/or administration.

The SAI has been reviewed by content experts and evaluated for relevance and content validity of material to the identified constructs (ATI, 2000). Psychometric properties are based on data collected from 8,204 students at 187 different nursing programs (ADN, BSN, PN or Diploma). The development of the SAI scales was driven by the responses to assessment items by a panel of content experts.

The SAI was composed of four content areas designed to assess an individual's critical thinking, learning styles, professional characteristics, and work values. Score reliability of the entire 195-item assessment was reported to be 0.9144 using coefficient alpha, a measure of internal consistency (*SEM* = .0534; ATI, 2000). Because each of the subscales represents a conceptually unique construct, reliability was also calculated for the subscales within each of the four content areas. The learning styles content area consists of 45 assessment items divided as follows: (a) Visual (*n* = 8), coefficient alpha 0.4747; (b) Auditory (*n* = 7), coefficient alpha 0.3084; (c) Tactile (*n* = 9), coefficient alpha 0.4479; (d) Individual (*n* = 11), coefficient alpha 0.5426; and (e) Group (*n* = 10), coefficient alpha 0.5846. To account for the influence of test length on the reliability of the shorter subscales, the Spearman-Brown formula was used to estimate the reliability of a test with the number of items in the corresponding area (ATI, 2000). Reliability, standard error of measurement, and Spearman-Brown predicted reliability for the assessment subscale scores were reported (Appendix B).

As noted in the review of literature, learning style instruments often had low reliability. The ATI SAI reported that the coefficient alpha for the learning styles' subscales range from 0.3084 to 0.5846. Nunnaly (1978) indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. When

evaluating the reliabilities of this SAI subscale, two points were made. First, the learning styles subscale was composed of a small number of items, 45 items, which will impact the scale reliability. Secondly, this subscale consisted of "non-cognitive (attitude-oriented) measures which show a lower reliability than cognitive (knowledge) measures" (M. Dunham, personal communication, August 17, 2009). Spearman-Brown predicted reliability relating psychometric reliability to test length was 0.7414 to 0.8636 for the learning styles items. It must be noted that the poor reliability presents a threat to validity.

Intent to Use Learning Style Preference Information Survey

A researcher-developed survey was used to collect data about student demographics such as age, gender, race/ethnicity, number of dependents, number of hours per week caring for dependents, whether currently employed, type of work experience, and hours per week working for pay. Academic variables such as GPA, type of BSN program enrolled, and years of education were collected. ATI SAI information variables were also assessed as part of the survey (Appendix A).

This self-report survey was designed with two subscales to determine whether the student had the ability to explain their learning style preference information as well as their intent to use learning style preference information. The study survey was designed based on the review of literature of learning styles of adult learners which guided the development of the conceptual model, Intent to Use Learning Style Preference Information (Figure 1). The demographic and academic items were derived from the literature. The ATI SAI information items asked about when, how and who provided the SAI information about the students' learning style preferences. The ability to explain

learning style preference information subscale, which incorporated the knowledge and comprehension subconcepts, consisted of 13 items. The intent to use subscale had seven items. The final survey contained a total of 20 subscale items. No reverse coding was required.

Content validity. The initial survey instrument was developed based on Netemeyer, Bearden, and Sharma's (2003) premise that a large pool of items could later be reduced based on the feedback of content experts and Lynn's (1986) two-stage procedure to determine content validity. The developmental stage consists of domain identification, item generation, and instrument formation. The judgment-quantification stage of content validity used a panel of content experts to determine that individual items and the entire instrument are content valid.

The content expert panel included five reviewers who were doctorally prepared nurse educators. According to Lynn (1986), a minimum of five experts is sufficient to control for chance agreement. Panel selection was based on experience with the target population, BSN curriculum, knowledge of learning style theory, expertise in instrument construction, and personal experience with the ATI SAI. Each content expert was provided information about the purpose of the study, definitions of the terms, the research question, and instructions on how to score each item using the content validity index (CVI). Rating of each item occurred on a four-point scale: 1 (*not relevant*); 2 (*slightly relevant*); 3 (*moderately relevant*); and 4 (*very relevant*). The CVI for the entire instrument (total CVI) is the proportion of items that receive a rating of three or four by the panel experts. Each item CVI was determined by the proportion of panel experts who rate individual items as three or four. According to Lynn (1986) total CVI and individual

item CVI should be greater or equal to 0.83 for the total instrument and/or individual items to be considered content valid. Items below 0.83 should be deleted or reworded to better reflect the domain. The panel was also asked for additional items or areas that should be added to the instrument.

Face validity. Face validity was conferred by a focus group of seven BSN students, three from the accelerated track and four from the four-year track. Their feedback after review of the instrument by the students was that overall it was relevant and sensible. Students had concern over the length of the instrument as it took them approximately 20 minutes to complete. Two items *Recognizing my learning style empowers me as a student* and *Knowing my learning style contributes to lifelong learning* was confusing to them. *My learning style has been measured before* was an item unclear due to a variety of definitions of what learning style meant to them. *I knew my learning style before taking the ATI Self Assessment Inventory* left students with a wide range for interpretation of the definition of learning style. Lastly, students reported that for one item *This information will help me achieve positive learning outcomes* they were unclear as to what positive learning outcomes meant. Based on information obtained from the test of the instrument for content and face validity, the survey was revised and used for data collection. Evidence of internal consistency reliability has been found with the current sample (Cronbach alpha range .92–.96), with more details regarding these results provided in Chapter Four.

Survey implementation was based on selected elements noted by Dillman (2007) Mail and Internet Surveys: The Tailored Design Method. These elements included: (a) a respondent-friendly survey, (b) up to five contacts with the survey recipient (Appendices F–I), and (c) personalized correspondence.

Data Collection

Institutional Review Board (IRB) approval was obtained from Indiana University–Purdue University Indianapolis (IUPUI; Appendix C) and six nursing programs. An electronic mailing list of deans and directors of baccalaureate nursing programs nationwide was contacted by email to determine if that nursing program administered the ATI SAI assessment. Those nursing programs that stated they administered the SAI were placed in a pool of possible schools for data collection. From that pool, a random selection of nursing programs was determined based on the Council for Higher Education Accreditation regions. This ensured a geographically diverse population. The deans, directors, or designated contact person of the selected nursing program were contacted by email and/or by phone to determine if they met the eligibility criteria and if they would give permission for their students to participate in this study. Each school was assured that IRB approval had been received from IUPUI. If the dean, director, or designated contact person agreed, they were emailed an invitation to participate letter which described the purpose of the study, confirmation of participation, IRB approval information, and confidentiality (Appendix D). If required, the IUPUI IRB approval was sent to the appropriate person as requested or individual school IRB approval was obtained. The researcher would contact the dean or director by phone after one week to determine confirmation to participate and timeline for data collection.

The dean, director, or designated contact person, was sent a letter of explanation outlining the student recruitment procedure (Appendix E). Schools were prescreened to ensure they shared SAI results with their students. Data were collected using the revised Intent to Use Learning Style Preference Information Survey (Appendix A) after the nursing program had administered the ATI SAI. Data collection occurred during weeks 10–15 of the semester that the SAI has been administered or weeks one through four of the following semester. This allowed the nursing program time to review the results from ATI and then discuss the results with the student(s) after the assessment had been completed. Students were forwarded an email by the nursing program asking for their participation in the study (Appendix F–I).

Survey data were collected by an online survey that did not have any identifiable information attached therefore each subject will be protected by the anonymity of the Internet. SurveyMonkey™ is an online survey system that was used to create, distribute, and collect survey data. A subscription to SurveyMonkey included encryption using Secure Socket Layer, which complied with Health Insurance Portability and Accountability Act and Family Educational Rights and Privacy Act requirements. SurveyMonkey had a privacy policy that assured that collected data were kept private and confidential (SurveyMonkey, 2009). The researcher was responsible to assure security of all data collected. All servers were kept in locked areas with digital surveillance equipment.

Participants completed the study survey online via SurveyMonkey, which ensured participant anonymity. Completion of the study survey implied consent to participate.

There was no traceable information and there was minimal risk to participation. Personal contact between the researcher and the subject did not occur.

Data Analysis

Descriptive and inferential statistics were used to analyze the data from the self-reported questionnaire. Descriptive statistics were used to summarize the demographic data. In the conceptual model, age, GPA, number of dependents, number of hours per week caring for dependents, number of hours per week work for pay, years of education as well as ability to explain were the continuous variables. Gender, race/ethnicity; type of work experience, type of BSN program enrolled, and type of learning style preferences were the categorical variables.

All independent variables were prescreened utilizing bivariate statistical testing. Bivariate statistics such as independent sample *t* tests and ANOVA were utilized to detect differences between the categorical independent variables and outcome variable, intent to use learning style preference information. Pearson correlation coefficient (*r*) was employed to detect the association between the continuous independent variables and outcome variable, intent to use learning style preference information. Pearson correlation was used to identify the association, (+1 to –1), in order to determine a more accurate prediction (Munro, 2005).

Significant predictor variables ($p = \leq 0.05$) were entered into a multiple regression model. Assumptions of multiple regressions were that the outcome variable, intent to use learning style preference information was a continuous variable and the Cronbach's alpha was reasonably high. Munro (2005) reported that the higher the reliability coefficient, the more accurate the internal consistency. Items were coded and recoded as necessary

(Appendix J) before entered into the regression model. Variables that were not significant were not placed into the final regression model.

Statistical analysis was completed utilizing SPSS 17 for Windows. Responses were downloaded to an Excel spreadsheet then imported into SPSS.

Summary

Nursing programs are using commercial tests to assess the learning style preferences of their baccalaureate students. The SAI (coefficient $\alpha = .9144$) developed by ATI was developed to help a student assess his or her own personal attributes as they relate to qualities of successful nursing candidates. Each study participant was assessed by her or his BSN program utilizing the SAI, which consisted of a learning styles subscale incorporating visual, auditory, tactile, individual and group elements.

The current literature indicated that students are frequently being assessed for their individual learning style preferences. However, the literature had very little evidence that suggested students understand or are able to explain their learning style preference information after they have been assessed. There was no literature found that examined whether students had any intent to use their learning style preference information. This study contributed to the literature by explaining the relationship between the current baccalaureate nursing students' demographic, academic, and ATI SAI information variables; ability to explain learning style preference information and their intent to use their learning style preference information as an approach to learning that may enhance academic achievement.

CHAPTER FOUR

RESULTS

The purpose of this study was to examine the relationship between the demographic, academic, and ATI SAI information variables; and the ability to explain learning style preference information with the intent to use learning style preference information by baccalaureate nursing students. Among current students enrolled in undergraduate baccalaureate nursing programs, which variables (demographic variables: age, gender, race/ethnicity, number of dependents, number of hours per week care of dependents, current employment, type of work experience, and hours per week work for pay; academic variables: GPA, type of BSN program, and years of education; ATI SAI information variables: when taken, who shared results, how results received, read results, what information reported, type of learning style preferences, understanding of results, and usefulness of learning style assessment; and ability to explain learning style preferences) are significantly related to student intent to use learning style preference information? This chapter describes the results of data analyses guided by the conceptual model presented in Chapter One. The preliminary exploration of the study instrument is discussed along with a description of data cleaning procedures. A detailed description of the sample and instrument measuring the study variables in the conceptual model follows. SPSS 17.0 was used for all instrument reliability and validity, screening for independent variables, and multiple regression statistical procedures in this study.

Preliminary Exploration of Instrument

The Intent to Use Learning Style Preference Information Survey (Burruss, 2009a) was the instrument used in this study to collect student data. Part I of the survey asked

questions regarding demographic and academic variables. Part II asked about the ATI SAI learning style preference information such as when was the SAI assessment taken, who shared and how were their results received. Part III of the survey represented the ability to explain and the intent to use learning style preference information subscales. The last item on the survey was an open-ended question in which students were asked to comment on how they planned to use their learning style preference information.

Content Validity

Five content experts that were doctorally prepared nurse educators were asked to determine the content validity of each item as well as the validity of the total instrument. Experts were asked to judge the representativeness and clarity of individual items. Feedback for instrument revision of items not representative of the concepts was elicited (Grant & Davis, 1997). A content validity index was completed for each item and total (Lynn, 1986). The CVI for the entire instrument (total CVI) is the proportion of items that receive a rating of three or four by the panel experts. Each item CVI was determined by the proportion of panel experts who rate individual items as three or four. All items rated as a three or four were retained. According to Lynn (1986) total CVI and individual item CVI should be greater or equal to 0.83 for the total instrument and/or individual items to be considered content valid. Items that were below 0.83 were deleted or reworded to better reflect the domain.

Based on the panel's feedback, the survey was revised. One item, *My learning style has been measured before*, was unclear due to a variety of definitions of what learning style meant to them. Another item, *I knew my learning style before taking the ATI Self Assessment Inventory*, left students with a wide range for interpretation of the

definition of learning style. These two items were deleted. An additional item was deleted as it represented eligibility criteria. Four items were deleted due to lack of clarity. Two items were combined into one by rewording the item. One item in the intent to use subscale was reworded to better reflect the domain. One item was confusing and therefore deleted. The panel asked that an additional item related to success on NCLEX-RN be added to the intent to use subscale.

Face Validity

Face validity resulted in revision of the questionnaire. Face validity was conferred by a focus group of seven BSN students, three from the accelerated track and four from the four-year track. Their feedback after review of the instrument by the students was that overall it was relevant and sensible. Students had concern over the length of the instrument as it took them approximately 20 minutes to complete. Two items, *Recognizing my learning style empowers me as a student* and *Knowing my learning style contributes to lifelong learning*, were confusing to them and therefore deleted. Another deleted item, *This information will help me achieve positive learning outcomes*, was not only confusing to them but students reported that they were unclear as to what positive learning outcomes meant.

Based on scoring results obtained from the test of the instrument for content and face validity, revisions to the survey were made. Twelve items were deleted, three items were reworded and one item was added. The final survey contained 13 items measuring the ability to explain items and seven intent items culminating in a total of 20 subscale items. Data collection proceeded utilizing the revised survey (see Appendix A).

Data Cleaning Procedures

Data from SurveyMonkey were placed into an SPSS statistical software program format. Descriptive statistics were used to describe and summarize the data. The frequencies of all variables were inspected to detect any missing or out of range responses. Frequency distributions were completed for specified categorical variables. The mean, standard deviation, median, and range were completed for specified continuous variables. Missing data was minimal. Cases with missing data were not included in the analyses. Out of 219 subjects who responded to the demographic and academic variables on the survey, 204 of those subjects fully completed the subscales. One respondent had missing data for subscale item 33. Mean case imputation was calculated for that subscale by averaging the subject's responses to items 31, 32, 34, 35. The score of 4.5 was added to item 33. For the other missing cases, more than half the questions in the subscale were not answered, therefore, mean imputation was not completed and those cases were not included.

Sample Demographics

A sample of 583 baccalaureate nursing students from six schools of nursing was invited to participate in the study. The 219 students who responded to the survey resulted in adequate power (Tabachnick & Fidell, 2001) and an acceptable response rate of 37.6%. The average response rate of surveys administered online is 30% (University of Texas, 2007). Of the 583 students invited, 364 students (62.4%) did not respond to the survey.

Schools of nursing were randomly selected utilizing the Council for Higher Education Accreditation regional directory (Council for Higher Education, 2009).

Eligible schools were randomly selected by region. If an eligible school was selected and declined to participate, another eligible school from that same region was randomly selected. Schools of nursing offered four year and/or accelerated option programs.

The demographic data of the current study clearly revealed a diverse sample of students. Students' ages ranged from 18 to 53 years with a mean age of 24.88 years. The respondents' were primarily female (82.2%) with 17.8% male, a greater percentile than the national profile of male students enrolled in a BSN program. The majority of students were White (55.7%) followed by 23.7% Black/African American, 7.3% Hispanic/Latino, 4.1% American Indian/Alaskan Native, and 6.4% Asian American/Pacific Islander. These sample findings are similar to the data from the 2008–2009 Annual Survey of Schools of Nursing reported by the NLN who reported that 70% of students currently enrolled in BSN programs are 25 years of age and under; 88% are female and 12% are male; 14% are African American, 7.4% Asian or Pacific Islander, 6.5% Hispanic, and 0.8% American Indian or Alaskan Native (NLN, 2009b).

In this sample, 21% of students reported having one to seven dependent(s). Hours per week of caring for dependents varied, with a range of 0 hours to 100 hours; the mean was 8.99 and the median was 0. Most students were currently employed (54.8%), and worked in nursing/healthcare (30.1%). The hours per week working for pay ranged from 0 hours to 40 hours with a mean of 9.1 hours and a median of 6 hours. See Table 1.

Table 1

Demographic Variables of Students

Characteristic	*N*	Frequency (%)	Mean (*SD*)	Median	Range
Age	219		24.88 (7.36)	22	18–53
Gender	219				
Female		180 (82.2)			
Male		39 (17.8)			
Race/Ethnicity	219				
White		122 (55.7)			
Black/African American		52 (23.7)			
Hispanic/Latino		16 (7.3)			
American Indian/Alaskan Native		9 (4.1)			
Asian American/Pacific Islander		14 (6.4)			
Other		6 (2.7)			
Dependents	219	46 (21%)			1–7
Hours per week caring for dependent(s)	219		8.99 (20.90)	.00	0–100
Employed currently	219				
Yes		120 (54.8)			
No		99 (45.2)			
Work experience	219				
Nursing/healthcare		66 (30.1)			
Business		24 (11.0)			
Education		6 (2.7)			
Sales		51 (23.3)			
Office Support		18 (8.2)			
Other		47 (21.5)			
None		7 (3.2)			
Hours per week work for pay	219		9.10 (11.12)	6	0–40

In addition to demographic data, academic data were also collected. Respondents reported a mean GPA of 3.41 and the median was 3.5. Of those students responding, the type of BSN nursing program in which they were enrolled was 57.5% in a four year program option and 42.5% were enrolled in an accelerated program option. The mean of years of education was 15.84 and the median was 15.00. See Table 2.

Table 2

Academic Variables of Students

Characteristic	*N*	Frequency (%)	Mean (*SD*)	Median	Range
GPA	219		3.41 (.55)	3.5	0–4
Type of BSN program	219				
Four year		126 (57.5)			
Accelerated		93 (42.5)			
Years of education	219		15.8 (2.36)	15	13–25

Of those responding to the ATI SAI information items of the survey, the majority of students (78.5%) had taken the ATI SAI during orientation, ATI learning style results were shared with the student predominantly by their faculty (39.5%). In most cases (43.4%), students received their learning style results through group discussion sessions with a printed hardcopy of their results. Of the study sample, 96.6% reported they read their results which included numeric scores indicating the type of learner the student is and the interpretation of the student's numeric scores. Based on the ATI SAI, the majority of students (61.5%) were visual learners and 72.2% were individual learners as opposed to group learners. Of the students in the sample, 96.6% reported they

understood what their ATI learning style scores meant and 75.1% reported they found their learning style assessment useful. See Table 3.

Table 3

ATI Self Assessment Inventory Information Variables

Characteristic	Frequency (n = 205)	Percentage
SAI taken		
Orientation	161	78.5
First semester	38	18.5
Second semester	2	1.0
Second year	1	0.5
Other	3	1.5
Who shared results		
ATI Coordinator	26	12.7
Faculty	81	39.5
Academic Advisor	19	9.3
Director	36	17.6
Dean	20	9.8
Staff member	2	1.0
Other	21	10.3
How received results		
Individual discussion	13	6.3
Group discussion	27	13.2
Printed hardcopy	68	33.2
Email	6	2.9
Group discussion with printed copy	89	43.4
Other	2	1.0
Read results		
Yes	198	96.6
No	7	3.4
Information reported		
Numeric scores only	62	30.2
Interpretation of numeric scores	12	5.9
Strategies to enhance learning preferences	7	3.4

(table continues)

Numeric and interpretation	97	47.3
Other	27	13.2
Learning style preference		
Visual	126	61.5
Auditory	19	9.3
Tactile	60	29.3
Learning style preference		
Group learner	57	27.8
Individual learner	148	72.2
Understand score meaning		
Yes	198	96.6
No	7	3.4
Learning style assessment useful		
Yes	154	75.1
No	51	24.9

Instrument Reliability and Validity

Internal Consistency Reliability

Internal consistency reliability for each subscale was tested utilizing Cronbach's alpha, inter-item correlation, and item-total statistics. Cronbach's alpha near .70 or greater demonstrates evidence of internal consistency (Tabachnick & Fidell, 2001). Items with inter-item correlations < .30 indicated items were not sufficiently related and may not contribute to the measurement of the variable (DeVellis, 2003). Item-total correlations were computed to determine how well the items within each subscale related to each other.

Cronbach's alpha for subscale items 23 through 27 (knowledge subconcept) was .403. Item-total correlation analysis demonstrated the correlation between each item and the corrected item-scale total for item 23 was 0.1; for item 25 was -.035; for item 27 was .237 which is < .30 evidencing poor internal reliability. Therefore, items 23, 25, and 27

were removed, leaving items 24 and 26. Cronbach's alpha for items 24 and 26 resulted in a reliability coefficient of .843, which is considered acceptable for a two item scale (Polit & Beck, 2008). The item-total correlation for items 24 and 26 were .730 respectively. These two items were retained. Items 24 and 26 were added to comprehension subscale items 28–35 (comprehension subconcept) resulting in a Cronbach's alpha of .883. All item-total correlations were > .30 and therefore retained.

Internal reliability of the intent subscale (items 36 through 42) was performed resulting in a Cronbach's alpha of .935. Item-total correlations ranged from .732 to .841 and were retained.

Factor Analysis

The Kaiser-Meyer-Olkin measure of sampling adequacy was .889, which supported the use of factor analysis for the data (Munro, 2005). Factor analysis analyzes shared variance and uses < 1.0 for communalities. Communalities are the proportion of shared variance in each observed variable that is predictable from the factor. To analyze covariance (communality) of each of the two remaining subscales, an initial factor analysis was performed utilizing principal axis factoring with varimax rotation. Convergence criteria were satisfied. According to the eigenvalues, there were two factors greater than 1.0. The scree plot suggested a two-factor solution. The goal of factor analysis is to reduce a large number of variables (items 24, 26, 28–42) to a smaller number or factors, to concisely describe the relationships among observed variables (Tabachnick & Fidell, 2001).

Exploratory factor analysis was computed with extractions for two factors. The first two factors of the total variance explained have eigenvalues > 1.0. Factor 1 has an

initial eigenvalue of 8.502, which explained 50.01% of total variance of 17 factors. For Factor 2, the initial eigenvalue equaled 3.475, which explained 20.442% of variance. Together, Factors 1 and 2 explained 70.452% of the variance. After extraction of the two factors, the rotated sums of squared loadings for Factor 1 was 7.69 and explained the most shared variance of 45.25%. The percent of total variance explained by the second rotated factor is 21.47%. Factors 1 and 2 explained a cumulative percent of 66.72. The subconcepts of knowledge (Q24, Q26) and comprehension (Q28–Q35) and intent (Q36–42) were reduced to two factors representing the ability to explain and intent to use domains.

Items with factor loadings .32 and greater, which suggest satisfactory loading (Tabachnick & Fidell, 2001), are depicted in Table 4. Twelve items loaded on Factor 1 with factor loadings of .739–.869 and represented the intent to use domain. Loading in the factor matrix references the importance of each variable to the factors. There are two factors and 17 variables. The correlation between item 37 and Factor 1 is the highest at .869. Squared correlation is the proportion variance shared, i.e., .869 squared equals .755 or 75.5% of variance in item 37 is explained by Factor 1. The correlation between item 32 and Factor 2 was the highest at .883. The squared correlation of .883 equals .779 or 77.9% of the variance in item 32. Factor 1 accounted for variance of 8.168 representing 48.046% of the total variance. Factor 2 accounted for a variance of 3.174 representing 18.672 of total variance. Five items loaded on Factor 2 with factor loadings of .754–.883 which were representative of the ability to explain domain.

Rotation of the factor matrix improves interpretability. Varimax maximizes variance with high or low correlation with each factor. The greater the loading, the more

the variable is a pure measure of the factor (Tabachnick & Fidell, 2001). Comrey and Lee (1992) stated that absolute values exceeding .71 are excellent. Rotated factor matrix items 24, 26, 28–30, 36–42 load high ranging from .739–.869 to Factor 1 Intent and items 31–35 load high ranging from .754–.883 to Factor 2 Explain. See Table 4.

Comrey (1988) stated that a sample size of 200 is adequate in most cases of ordinary factor analysis that involves no more than 40 items. Tinsley and Tinsley (1987) suggest a ratio of five to ten subjects per item up to about 300 subjects. However, larger samples increase the generalizability of the conclusions reached by means of factor analysis (DeVellis, 2003).

Table 4

Factor Loading for Intent and Explain Domains

Item	Factor 1[a]	Factor 2[b]
Q24	.757	.088
Q26	.806	.112
Q28	.777	.223
Q29	.820	.196
Q30	.793	.188
Q31	.131	.780
Q32	.121	.883
Q33	.075	.754
Q34	.083	.847
Q35	.104	.871
Q36	.797	.087
Q37	.869	.181
Q38	.836	.106
Q39	.757	.057
Q40	.739	.099
Q41	.863	.023
Q42	.746	-.071

[a]Factor 1 eigenvalue = 7.69, 45.25% of the variance. [b]Factor 2 eigenvalue = 3.64, 21.47% of the variance.

Internal consistency reliability testing for Factor 1 (intent domain) resulted in a Cronbach alpha of .955 for 12 subscale items. Inter-item and item-total correlations were

examined for all items within each factor. All items demonstrated satisfactory correlation (>.30) within each factor. Average inter-item correlations ranged from .47 to .85 for these 12 items suggesting satisfactory correlations. Likewise, the item-to-total correlations ranged from .708 to .863, which supports satisfactory correlations between the items and the total scale (see Table 5).

Table 5

Item-total Correlations and alpha if Deleted Statistics for the Intent Domain

Items	Item-to-total Correlations	Alpha if Deleted[a]
Q24	.743	.952
Q26	.790	.951
Q28	.778	.951
Q29	.817	.950
Q30	.784	.951
Q36	.782	.951
Q37	.863	.949
Q38	.819	.950
Q39	.747	.952
Q40	.729	.953
Q41	.835	.950
Q42	.708	.954

[a]Cronbach's alpha for total intent to use domain subscale was .955.

Internal consistency reliability testing for Factor 2 (explain domain) resulted in a Cronbach alpha of .917 for five subscale items. Inter-item and item-total correlations were examined for all items within each factor. All items demonstrated satisfactory correlation (>.30) within each factor. Average inter-item correlations ranged from .58 to .83 for these five items suggesting satisfactory correlations. Likewise, the item-to-total correlations ranged from .725 to .843, which supports satisfactory correlations between the items and the total scale (see Table 6).

Table 6

Item-total Correlations and alpha if Deleted Statistics for the Explain Domain

Items	Item-to-total Correlations	Alpha if Deleted
Q31	.753	.906
Q32	.843	.888
Q33	.725	.914
Q34	.808	.895
Q35	.830	.892

[a]Cronbach's alpha for total explain domain subscale was .917.

Research Question

This study sought to answer the question: Among current students enrolled in undergraduate baccalaureate nursing programs, which variables (demographic variables: age, gender, race/ethnicity, number of dependents, number of hours per week care of dependents, current employment, type of work experience, and hours per week work for pay; academic variables: GPA, type of BSN program, and years of education; ATI SAI information variables: when taken, who shared results, how results received, read results, what information reported, type of learning style preferences, understanding of results, and usefulness of learning style assessment; and ability to explain learning style preferences) are significantly related to student intent to use learning style preference information?

The specific aim of this study is to determine the independent variables that significantly relate to the intent to use learning style preference information guided by a theoretically based conceptual model.

Screening for Independent Variables

Correlations of Continuous Variables to Intent

The continuous independent variables of age, number of dependents, number of hours per week caring for dependents, number of hours per week working for pay, GPA, years of education, and the ability to explain learning style preference information were correlated with the dependent variable intent to use learning style preference information. Years of education was negatively correlated with intent to use learning style preference information ($r(202) = -.169$, $p = .016$). The ability to explain correlated positively to intent to use learning style preference information, $r(202) = .232$; $p < .001$. The correlation between age, GPA, number of dependents cared for, number of hours spent caring for dependents, and number of hours worked were not significantly related to the intent to use learning style preference information (see Table 7).

Table 7

Screening for Continuous Variables for Regression Using Pearson r Correlation

	Age	Depend[a]	Hrscare[b]	Hrswork[c]	GPA	Yrsedu[d]	Expl[e]	Inten[f]
Demographic								
Age	---							
Depend[a]	.57**							
Hrscare[b]	.35**	.67**						
Hrswork[c]	.02	.14*	.11					
Academic								
GPA	-.09	-.09	-.17*	.01				
Yrsedu[d]	.46**	.18**	.20**	-.14*	-.01			
Expl[e]	-.15*	-.12	-.10	.05	.20**	-.12		
Intent[f]	-.02	.09	.10	.09	-.08	-.17*	.23**	---

[a]Depend = Number of dependents. [b]Hrscare = Number of hours per week care of dependents. [c]Hrswork = Hours per week work for pay. [d]Yrsedu = Years of education. [e]Expl = Ability to explain. [f]Inten = Intent to use. *$p < .05$, two-tailed. **$p < .01$, two-tailed.

Independent Samples Test of Categorical Variables

Categorical variables were screened for inclusion in the multiple regression analyses using independent samples *t* test. Based on the type of program, the mean scores of the four year and accelerated program students were found to be significantly different. The mean of the four year program students was significantly higher than the mean of the accelerated program students (see Table 8).

Prior to screening categorical variables for possible inclusion as independent variables in the regression model, some variables were recoded due to multiple categories (see Appendix J). The variable *who shared results* with the student was collapsed from eight categories to two: (a) faculty or (b) other. The independent samples *t* test found a significant difference between the means of the two groups. When the results of the ATI SAI learning style preference information were shared with the student by other (ATI coordinator, academic advisor, director, dean, staff member) the intent to use the learning style preference information was higher than if the information was shared with the student by the faculty. A one-way ANOVA comparing the intent to use learning style preference information based on who shared the SAI results with the student revealed a significant difference, $F(7, 196) = 2.16$, $p = .039$, however the Tukey multiple comparisons test did not indicate significant differences between individuals who shared the results with the students (see Table 8).

The mean scores of students who found their learning style assessment to be useful compared to those student who did not find their learning style assessment useful reported a significant difference between the means of the two groups. The mean of students finding the assessment useful was significantly higher than the mean of the

students that did not (see Table 8). When the results were shared by the academic advisor, 95% of the students perceived the learning style assessment to be useful.

Table 8

Screening for Categorical Variables for Regression Using Independent Samples t Test

Variables	*N*	*t*	*df*	Mean (*SD*)	*p*
Academic					
Type of BSN program		2.68**	202		.008
Four year	112			47.63 (6.68)	
Accelerated	92			44.54 (9.68)	
ATI SAI Information					
Who shared results		-2.5*	202		.013
Faculty	80			44.45 (8.96)	
Other	124	47.38		(7.65)	
Usefulness of learning style assessment		8.84**	202		.000
Yes	153			48.76 (6.03)	
No				38.67 (9.53)	

*$p < .05$, two-tailed. **$p < .01$, two-tailed.

There was no significant difference between the mean score of subjects by gender, current employment, if read results, learning style type 2 (individual or group learner), and understanding results. Eight categorical variables were recoded to dicotomous variables appropriate for regression (see Appendix J). Race, type of work, when the SAI was taken, how received, information reported, and learning style type 1 (visual, auditory or tactile learner) were not significant.

Multiple Regression Model

Screening for potential variables to be placed in the multiple regression equation was completed. Only variables with significant Pearson *r*'s or *t* tests with intent to use learning style preference information, were entered into the regression equation (Mertler & Vannatta, 2005). A standard multiple regression model was utilized, whereby the five significant variables (type of BSN program, years of education, who shared results, usefulness of learning style assessment, and ability to explain learning style preferences) related to intent to use learning style preference information were entered simultaneously into the regression model. A significant regression equation was found in the final model related to intent to use learning style information, $F(5, 198) = 19.07$, $p < .001$. The table of coefficients was then utilized to demonstrate a relationship with the dependent variable, intent to use learning style preference information. The variables type of BSN program, years of education, who shared results, usefulness of learning style assessment, years of education, and ability to explain when entered into the model accounted for 32.5% of the variance (30.8% adjusted) in the intent to use learning style preference information. See Table 9.

Table 9

Summary of Simultaneous Regression Analysis of Significant Variables on Intent to Use Learning Style Preference Information

Independent Variables	β	Beta	*t*	*p*
Academic				
Type of BSN program	-.923	-.056	-.801	.424
Years of education	-.080	-.023	-.333	.740
ATI SAI information				
Who shared results[a]	1.49	.088	1.48	.142
Usefulness of learning style assessment	-9.28	-.486	-8.06	.000**
Ability to explain	.520	.168	2.84	.005**

[a]Recoded variable.
$R = .57$. $R^2 = .325$. Adjusted $R^2 = .308$. * $p < .05$. **$p < .01$.

Based on the final regression model, perceived usefulness of the learning style assessment and the ability to explain learning style preference information were significantly related to the outcome variable, intent to use learning style preference information.

Qualitative Data Analyses

The qualitative data from the survey confirmed the quantitative data. Item #43 on the study survey asked students to comment on how they planned to use their learning style preference information. Students (n = 101) responded to the open-ended question and analysis of the comments was completed by word counting. Word counts are useful for discovering themes of ideas in any body of text, including open-ended questions (Denzin & Lincoln, 2003). As noted in Table 3, 75.1% of students reported that their learning style information was useful to them. This corroborated the themes or patterns of words that were noted in the text.

Some students reported that they intended to use their learning style preference information in order to improve their grades and GPA. Students stated they want "to develop better study skills" and "help prepare" for the classroom in order to improve their course grades. Similarly, students planned to use their learning style preference information when studying for exams in order to improve their exam scores. A student stated, "I will use it to help me study better and make it easier to retain information so I can boost my GPA and graduate with honors."

Many respondents identified what type of learner they were based on their learning style preference results and questioned what strategies they might employ to assist them in their learning. Students indicated they intended to talk with their professors and ask for help with strategies that would enhance their learning. Students also commented that it was important for professors to view students' learning style preference information and develop teaching plans in a way that would enable their learning. They commented they would like to use those strategies to "take in more information and process it in depth." One respondent stated, "I want to pass my NCLEX exam and using this information will help me do that."

The majority of students (72.2%) reported they were individual learners as opposed to group learners. One student stated, "for exams or clinical, studying or practicing alone may help me be a better student." Various students commented on how they planned to first study alone then felt it beneficial to discuss the course material with a peer group.

Students remarked how using their learning style preference information would "carry over to clinical," "make me a better nurse in practice," "better prepare myself to

become a successful nurse," and "use this information in preparation for clinical." One student remarked that "I may ask my instructors to demonstrate a clinical skill instead of just telling me how to do it" based on my learning style assessment.

Not all students (24.9%) felt their learning style assessment was useful. This was confirmed by the qualitative data that indicated students were "already aware of these results," that this "was not new information," and they "did not plan to use it." Some students reported they have the ability to adapt to any learning situation and still would be successful.

Summary

A description of the data cleaning procedures, the sample, the instrument, and screening procedures was provided. The data analyses used to test the conceptual model were also presented. The results specific to the research question was presented. Significant correlations between the academic variables, type of BSN program and years of education; ATI SAI information variables, who shared results, usefulness of the learning style assessment, and ability to explain were found. A standard multiple regression equation demonstrated that 32.5% of the variation in the intent to use learning style preference information was significantly related to the five independent variables. The following chapter will present a discussion of the study findings.

CHAPTER FIVE

DISCUSSION

The purpose of this chapter is to discuss the findings, conclusions, limitations and implications of this study which was designed to examine variables (demographic variables: age, gender, race/ethnicity, number of dependents, number of hours per week care of dependents, current employment, type of work experience, and hours per week work for pay; academic variables: GPA, type of BSN program, and years of education; ATI SAI information variables: when taken, who shared results, how results received, read results, what information reported, type of learning style preferences, understanding of results, and usefulness of learning style assessment; and ability to explain learning style preferences) significantly related to students' intent to use learning style preference information among current students enrolled in undergraduate baccalaureate nursing programs. Findings and conclusions related to the research question are discussed. Limitations of the study follow. This chapter concludes with implications for nurse education and recommendations for future research.

Learning Styles

In previous literature, undergraduate nursing students' learning style preferences and their impact on the educational processes were studied. However, the current student population entering baccalaureate nursing programs is very different from what is reported in the previous literature. Students' profile is now more complex by age, ethnicity, educational experiences, and learning style preferences (Meehan-Andrews, 2009). Students are now entering BSN programs with a rich background of life and work experiences.

Based on the review of literature, a gap was identified requiring information on whether current BSN students whose learning style preferences had been measured were using that information to help themselves be successful. The current study focused on undergraduate nursing student's intent to use learning style preference information as they relate to demographic, academic, ATI SAI information variables and the ability to explain learning style preference information (see Figure 1).

Findings and Conclusions

This descriptive study resulted in a sample of 219 students enrolled in one of six geographically diverse baccalaureate nursing programs in the United States. The review of literature revealed demographic and academic variables that were related to learning styles. ATI SAI information variables and the ability to explain learning style preference information represent a gap to the previous body of literature. A conceptual model was developed (Figure 1) which incorporated demographic, academic, ATI SAI information variables as well as the ability to explain learning style information. Previous research also did not address students' intent to use learning style preference information.

Research Question

Among current students enrolled in undergraduate baccalaureate nursing programs, which variables (demographic, academic, ATI SAI information; and ability to explain learning style preference information) are significantly related to students' intent to use learning style preference information? The independent variables type of BSN program, years of education, who shared results, usefulness of learning style assessment and the ability to explain learning style preference information were reported to be significant. Multiple linear regression of these independent variables accounted for

32.5% of the variance (30.8% adjusted) of the outcome variable, intent to use learning style preference information.

Demographic Variables

Age. In this study, age demonstrated a significant positive correlation to the number of dependents, number of hours per week caring for dependents, and years of education. Older students were more likely to have a greater number of dependents, hours caring for dependents and years of education. A significant negative correlation was reported for the ability to explain learning style preference information and age. This indicated older students had a decreased ability to explain. There was no significant relationship between age and intent to use learning style preference information. While intent to use learning style preference information has not been studied in the past, a few researchers had found no significant relationship between learning styles and age (Edwards, 2005; Linares, 1999; Merritt, 1983) while others (Harrelson, Leaver-Dunn, & Wright, 1998; Morton-Rias et al., 2007) reported age-related learning style differences.

Gender. In the current study sample, females comprised 82.2% and males 17.8%, which is greater than the national profile of 12% (NLN, 2009b). Gender was not significantly related to the intent to use learning style preference information, however, females reported greater intent than males. Previous research by Fahy and Ally (2005) and Edwards (2005) found no significant relationship between learning style preferences and gender.

Race/ethnicity. In previous research, LaMothe and associates (1991) found no significant differences in learning styles by race in their single site study in which racial differences accounted for 87% White students, 5% Black students, 1.5% Asian students,

one Native American student, and one Latin student. In the current study, students' demographic profile mirrored the 2008 - 2009 NLN Annual Survey of Schools of Nursing which reported 14% of BSN students are African American, 7.4% Asian or Pacific Islander, 6.5% Hispanic, and 0.8% American Indian or Alaskan Native (NLN, 2009b).

While not significant, the current study found that Asian American and Pacific Islander students were the most likely to use their learning style preference information. American Indian and Alaskan Native students reported the least intent to use learning style preference information.

Number of dependents. Metzner (1989) and Jeffreys (2004) reported that environmental factors such as dependent care may influence a student's academic performance and retention. In this study, the number of dependents ranged from no dependents to seven dependents with 21% of the sample reporting a least one dependent. Number of dependents was significantly correlated to age, number of hours per week caring for dependents, hours per week working for pay, and years of education. Although not statistically significant, students with six to seven dependents reported intent to use learning style preference information to a greater extent than students who had fewer or no dependents. This may be suggestive of a student's strong intent to maximize the time available for studying and preparing for class by utilizing their learning style preference information.

Number of hours per week care of dependents. In the present study, the mean number of hours per week respondents cared for dependents was 9.0 hours. Students who spent more time caring for dependents reported more intent to use learning style

preference information than students who cared for dependents fewer hours per week. Students caring for dependent(s) 80 hours per week reported the greatest intent to use learning style preference information. However, the number of hours per week care of dependents was not significant for intent to use learning style preference information. As with the number of dependents, students with fewer hours available to study may intend to maximize the use of their learning style preferences in order to be successful.

Current employment. In this study, more than half of the students reported that they were currently employed. Employed students reported a greater intent to use learning style preference information than the students that were not currently employed. Current employment was not significant for intent to use learning style preference information. In a related study, Merritt (1983) found that length of employment did not account for differences in learning style preferences.

Type of work experience. Of the students in this sample, most had nursing/healthcare experience followed by sales experience, business, office support, and educational work experiences, respectively. Few students reported having had no work experience. Students with an education type of work experience followed by those students with no work experience reported having the highest intent to use learning style preference information however this variable was not statistically significant.

Hours per week work for pay. The hours per week working for pay ranged from zero to 40 hours per week. The average number of hours per week was 9.1. Hours per week working for pay positively correlated with the number of dependents but negatively correlated with years of education indicating the more hours students' worked for pay the fewer the number of years of education they had. Shih and Gamon (2001)

reported that the number of work hours per week were not associated with academic achievement regardless of learning style. Similarly, the findings of this study are that hours per week working for pay were not significantly related with intent to use learning style preference information.

Academic Variables

GPA. Previous researchers found no significant relationship between learning style preferences and academic achievement (Billings & Cobb, 1992; Cook et al., 2007; Edwards, 2005; Harris et al., 2003; Johnson & Johnson, 2006). In this study, the sample's mean GPA was 3.4. This was negatively correlated with the number of hours per week spent caring for dependent(s) indicating the more hours spent caring for dependent(s) the lower the student's GPA. It was positively correlated with the ability to explain learning style preference information, suggesting the higher the GPA the greater the ability to explain. Billings and Cobb (1992) found students with a higher GPA to be more motivated and may account for their ability to explain their learning style preference information. It was not a significant variable for intent to use learning style preference information.

Type of BSN program. The majority of students were enrolled in a four-year program option. The type of program that the student was enrolled in was significant for the outcome variable, intent to use learning style preference information. The four-year students reported greater intent to use their learning style preference information than did students in an accelerated program option.

Students in accelerated nursing programs have previous college experience and may be motivated to be successful even with their stressful family and work schedules.

Some students commented that they felt their learning style preference information "was not new information" and therefore "did not plan to use it." Suliman (2006) reported in the literature that four year students and the accelerated students have different learning styles but did not comment on their intent to use learning style preference information.

Years of education. Years of education was positively correlated to age, number of dependents, and number of hours per week caring for dependents. It was negatively correlated with hours per week working for pay and the outcome variable, intent to use learning style preference information. Students' intent to use learning style preference information may be reduced with more years of college experience. These findings were supported by the qualitative data that indicated students were "already aware of these results," that this "was not new information" and they "did not plan to use it."

ATI SAI Information Variables

In this study, the majority of students reported taking the ATI SAI during orientation to the nursing program. Some students reported taking it during the first semester, took it during the second semester and a few took the assessment during the second year.

As part of the eligibility criteria for this study, students had to be informed of the ATI SAI results after they had taken the assessment. Students were asked to report who had shared these results with them. The results were shared primarily by faculty and others such as a director, ATI coordinator, and academic advisor. Who shared results with the student revealed significant differences in the student's intent to use learning style preference information. Students' intent to use learning style preference

information was highest when shared by the academic advisor and lowest when shared by the nursing program's ATI coordinator.

The majority of students received their results in a group discussion with a printed copy followed by a printed hardcopy without discussion. When taken online the ATI SAI will automatically generate a print out showing the student their individual results and the student has the option to print it. Most students indicated they did read their ATI SAI results.

Most students reported they received numeric and interpretative data about their ATI SAI results. Some students reported they received their numeric scores only. Fewer reported they received information about interpretation of their numeric scores and only 3.4% of students received information on strategies to enhance learning preferences.

In the present study, students were asked to indicate the type of learning style preferences that they had scored highest on the ATI SAI. The majority of students reported they scored highest as a visual learner, followed by tactile learner, and lastly as an auditory learner. Despite the variety of learning style preferences demonstrated by the sample, students reported they preferred being individual learners as opposed to group learners. Bremner, Aduddell, and Amason (2008) assessed first year baccalaureate nursing students utilizing the ATI SAI. They reported that the majority of their students preferred visual and tactile learning but preferred learning in groups as opposed to the findings of this study where students reported being individual learners.

Student understanding of their ATI SAI results was of interest to this study. Most students surveyed reported that they did understand what their ATI SAI learning style

scores meant. However, a few of the respondents indicated they did not understand their assessment results.

Significant differences were reported for the usefulness of learning style assessment as it related to the intent to use learning style information. The majority of students reported that their learning style assessment was useful to them while some of the students did not. These results conclude that the more useful the information was to the student the greater their intent to use the information. In the literature, Terrell (2002) stated the value of learning styles may be important as a predictor of student attrition.

Ability to Explain Learning Style Preference Information

Ability to explain was negatively correlated to age. Older students are not able to explain learning style preference information as well as younger students. The ability to explain learning style preference information was positively correlated to GPA and the outcome variable, intent to use learning style preference information. Students with higher GPAs indicated a greater ability to explain learning style preference information. Additionally, the greater the ability to explain learning style preference information, the more intent to use learning style preference information students reported.

Outcome Variable

Intent to use learning style preference information. There were no demographic variables that were significantly related to the intent to use learning style preference information. Two of the academic variables, the type of BSN program in which the student was enrolled and the years of education were significantly associated with intent to use the learning style information. Of the ATI SAI information variables, the person who shared the assessment results and the usefulness of the learning style

assessment were significantly related to the intent to use learning style preference information. The ability to explain learning style preference information was significantly correlated to intent to use. Overall, student comments on the survey supported the intent to use of the learning style preference information.

Students responded to the open-ended question expressing appreciation for the opportunity to discover how they learn and how to study more efficiently which ultimately may improve their academic success. Responses documented by the students included "develop better study skills," "helps me with study strategies," and "helps me prepare" for the classroom. Students remarked how using their learning style preference information will "carry over to clinical", "make me a better nurse in practice", "better prepare myself to become a successful nurse", and "use this information in preparation for clinical". Many respondents identified what type of learner they are and what strategies they will employ to assist them in their learning. One respondent stated, "I want to pass my NCLEX exam and using this information will help me do that." These findings were similar to those of Morton-Rias and associates (2007).

Limitations

Limitations of this study included selection bias due to voluntary participation. English as a second language for subjects responding to the survey in English may have been a limitation (Klein et al., 2007), and the self-report measures would have limited the objectivity of the findings. In this study, students completed the ATI SAI at different times in their nursing program so data were not collected at the same point in time after taking the SAI. Of the 583 students invited, it is not known why 62.4% of the students did not respond to the survey. All students who participated completed the demographic

data but a few students did not respond to the two subscales, ability to explain and intent to use learning style preference information questions.

Limitations occurred for students who may have received their results but reported they did not read their results or did not get adequate information reported to them from the nursing program after they had been assessed. Schools may have had various procedures to discuss learning style information with their students. In many cases, the nursing program may need to review its procedures and do an intervention.

Implications for Nursing Program Administrators

The NLN recommends identification of individual learning styles of adult, multicultural, at-risk, and second degree learners (NLN, 2008). Given the demands to minimize student attrition, maintain high NCLEX-RN pass rates, and accommodate large class sizes (Giddens, 2008), many nursing programs are incorporating learning style assessments into their curriculum. Many of the learning styles instruments commercially available may have a low reliability but are practically and educationally significant (Billings, 1991; Lovelace, 2005) for use with undergraduate nursing students. Therefore, nursing program administrators should determine which learning style instrument best fits their need to identify the learning style preferences of individual students and aggregate groups entering their programs.

Nursing programs are pledging substantial resources to assessing student learning style preferences; however, examining the students' intent to use this information is an important further consideration. Students in the four-year and accelerated program options come with different levels of awareness of their learning style preferences and have varying levels of intent to use learning style preference information. In this study,

the four-year program option students reported greater intent to use their learning style preference information as compared to the accelerated program option students. Further, the more overall years of education the students had, the less their intent to use learning style information. These findings may prove to be a factor when investing fiscal resources into these commercially developed learning style inventories. Programs may want to consider student demographics such as the type program option enrolled and overall years of education of the student in determining assessment needs.

Nursing programs may need to review their processes of reporting learning style preference information to students. In the current study, students reported they may have received their results but did not read them. Some students indicated they did not get adequate information reported to them from the nursing program after they had taken the learning style assessment. It is important to note that students in this study demonstrated differences in their intent to use learning style preference information based on who shared their learning style results with them. Students' intent to use learning style information was greatest when the results were shared by the student's academic advisor. Most students took the learning style inventory during orientation and may have had the most contact with the nursing program's academic advisor(s). The academic advisor(s) may have spent time discussing the results and how important it was to a student's academic progression and success in the curriculum. Up to this point, contact with faculty may have been limited or nonexistent.

Nursing programs who delegate other personnel such as faculty to inform students of their learning style results may need to assist faculty on how to be most effective when sharing results with students. Many assessments or inventories provide a computerized

graphical profile of learning style preference information that would be easy to share with students. Personnel who are assisting students to interpret their information should utilize the printed hardcopy of student results and schedule individual or group discussion sessions with students. The ATI SAI provides a convenient, computer generated print out of individual student and aggregate results that can be easily discussed with students and faculty. There is also the potential for faculty to use the aggregate results provided online but may need assistance on how to interpret it.

Nursing programs need to understand students' perception of the usefulness of learning style assessments. This study reported a significant relationship between students who felt their learning style assessment was useful to them and their intent to use learning style information. Nursing programs may benefit from examination of the students' perception of the usefulness of learning style assessments over the course of the nursing program not just at orientation.

Administrators may want to sponsor college-wide presentations and professional development seminars for students and faculty to increase their understanding of the benefits of learning style preference information. In all these cases, the nursing program may need to evaluate its feedback processes and perform follow up interventions with students.

Implications for Nurse Educators

Early identification of learning style preferences in their academic career is important for students. They need to be assisted by nurse educators to understand the usefulness of their learning style preference information. Usefulness of the learning style assessment was significantly related to the students' intent to use the learning style

preference information. Educators can impact a student's perception of the usefulness of their learning style results by strategizing with students on how to approach subject material and how best to do his or her studying. Once an educator knows a learner's preferred learning style, that information can be used when tutoring or counseling that learner (Wellman, 2009).

Strategizing with students on how to use their learning style preference information is important, yet, few students in this study reported receiving strategies aimed at helping them be successful. Educators need to talk with students about doing their studying with strategies responsive to their styles (Reese & Dunn, 2007). Visual learners have a strong preference for color diagrams, concept maps, pictures, and tables that may have key information highlighted. Tactile learners prefer hands-on activities and use of physical models. Auditory learners prefer lecture, reading aloud, listening to video or books on tape as well as class discussion in order to learn. An individual learner prefers to learn independently with time to reflect on the information. Group learners desire to learn information by sharing and listening to the perspective of others. Educators may do well to offer independent and/or group assignments. For example, a case study as a course assignment may be completed by an individual or by a group of student(s) depending upon the student's preference. With a variety of learning styles in a potentially large size class, educators must use an array of teaching/learning strategies and offer an assortment of assignments.

In follow-up discussions with students, educators should evaluate whether students understand these strategies, intend to use them, and whether they make a difference in student academic success. Implementation of a strategic plan may enable

current diverse students to be more effective in their study skills and successfully achieve their academic goals. Instructional strategies throughout the curricula should be adapted to learner needs which may help to reduce dropout rate (Liu, 2007).

The ability of the student to explain their learning style preference information was significantly related to the intent to use this information. It is recommended that after the learning style assessment has been completed, individual or group sessions should be held to discuss results. It is essential that during this session, students be asked to explain in their own words, their learning style preference information. Not only will this reinforce learning but information can be evaluated for accuracy.

Recommendations for Future Research

Nursing programs need to examine the resource intensive administration of learning style inventories and the possibility that students' may lack the intent to ever use the information assessed by these inventories. In this study, students in the accelerated program option reported little intent to use learning style preference information. The students with greater number of overall years of education also reported significantly lower intent to use learning style preference information. Further exploration of why students have more or less intent to use learning style preference information is necessary.

Development and instruction of students about strategies that maximize the use of their learning style preference information is a key step that would seem to have been neglected thus far. Implementation of these strategies by the students should be evaluated. It would be beneficial to examine faculty's perception of the importance of learning style information and how they would envision themselves implementing

strategies in their courses. The effect the various strategies have on student outcomes should be examined in relation to the classroom, clinical and NCLEX success. Investigation of student intent to use learning style preference information and student academic success including NCLEX performance may prove to be important research for nursing education.

Nursing programs need to evaluate their processes of reporting results to students and the effectiveness of personnel who share learning style preference information. When the academic advisor(s) shared their learning style results, students reported greater intent to use learning style preference information. It is not well understood how the academic advisor reported results that impacted students' intent to use learning style preference information so positively. It would be beneficial to examine faculty's perception of how they would report results to students and their role in assisting students to be successful.

Further research is needed to examine student perception of usefulness and why this information is useful to them or not. Also, factors related to student's ability to explain learning style preference information should be investigated. In this study, usefulness and the ability of explain learning style preference information by the student were significantly related to intent to use learning style preference.

While not significant, intent to use learning style preference information was greater for females than it was for males. Students of Asian American/Pacific Islander background reported the greatest intent to use learning style preference information and American Indian/Alaskan Native students reported the least intent. These differences in

intent to use learning style preference information by race/ethnicity are of interest for future research.

Conclusion

Nursing education is in a pivotal position to facilitate recruitment and retention of students with greater gender, racial and ethnic diversity within the profession. Given the faculty shortage, demands to minimize student attrition, maintain high NCLEX-RN pass rates, and accommodate large class sizes, nurse educators must consider the learning style preferences of the current diverse student population (Giddens, 2008). The intent to use learning style preference information was highest for students in the four year option program, those with fewer years of education, those who had their results shared with them by an academic advisor, as well as those that perceived the learning style assessment as useful and reported the ability to explain their learning style preference information. Implementation of learning style preference information by students and faculty may enhance retention and graduation rates of diverse baccalaureate nursing students.

APPENDIX A

INTENT TO USE LEARNING STYLE PREFERENCE INFORMATION SURVEY

All responses are confidential and your identification will remain anonymous. Completion of this questionnaire will indicate your consent to participate in the study.

Part I: Demographics
This section asks questions about your status as a current student. Please answer each question. Remember all responses are strictly confidential and your identification will remain anonymous.

What is your age? _____

What is your current cumulative Grade Point Average (GPA)? _____

Which type of BSN program are you enrolled?
_____ Four-year program option
_____ Accelerated program option

Indicate the overall number of years of education you have? _____

What is your gender?
_____ Female
_____ Male

What is your race/ethnicity?
_____ White/Caucasian
_____ Black/African American
_____ Hispanic/Latino
_____ American Indian/Alaskan Native
_____ Asian American/Pacific Islander
_____ Other:

Type here

How many dependents are you currently responsible for? _____

How many hours per week on average do you spend caring for dependent(s)? _____

Are you currently employed?
_____ Yes
_____ No

What type of work experience do you have?
_____ Nursing/Healthcare
_____ Business
_____ Education
_____ Sales
_____ Office support
_____ Other
_____ None

Approximately how many hours per week do you work for pay? _____

Part II: This section asks questions about when, how and who provided information about your learning style preference information. Please indicate your answer from the drop down box.

When in the program did you take the ATI Self Assessment Inventory (SAI)? (check all that apply)
_____ During orientation
_____ During the first semester
_____ During the second semester
_____ During the last semester
_____ Other:

Type here

If yes, who shared your learning style results with you? (check all that apply)
_____ ATI Coordinator
_____ Faculty
_____ Academic Advisor
_____ Director
_____ Dean
_____ Staff Member
_____ Other:

Type here

How did you receive your ATI learning style results? (Check all that apply).
_____ Individual discussion session
_____ Group discussion session
_____ Printed hardcopy of results
_____ Email
_____ Other:

Type here

Did you read your results?
_____ Yes
_____ No

What information was reported to you about your learning style results? (Check all that apply).
_____ Numeric scores indicating the type learner I am
_____ Interpretation of my numeric scores
_____ Strategies to enhance my learning preferences
_____ Other:

Type here

Based on the ATI Self Assessment Inventory, what learning style did you score highest on?
_____ Visual
_____ Auditory
_____ Tactile

Based on the ATI Self Assessment Inventory, what learning style did you score highest on?
_____ Group Learner
_____ Individual Learner

Did you understand what your ATI learning style scores meant?
_____ Yes
_____ No

Overall, was your learning style assessment useful to you?
_____ Yes
_____ No

Part III: This section asks questions about your knowledge about, comprehension of and intent to use the learning style information that you obtained from the ATI Self Assessment Inventory (learning style inventory) you completed recently. Please indicate whether you strongly agree, agree, neither agree or disagree, disagree or strongly disagree with the statement.

Indicate how strongly you **agree** or **disagree** with each of the following statements: (one response per question)	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
23. Taking the ATI Self Assessment Inventory is the first time my learning style has been measured.	1	2	3	4	5
24. Knowing my learning style is valuable to me as a student.	1	2	3	4	5
25. The ATI Self Assessment Inventory results are the same as what I already knew my learning style to be.	1	2	3	4	5
26. Identifying my learning style will help me to be more effective with my studies.	1	2	3	4	5
27. I can define what my learning style preferences are.	1	2	3	4	5
28. Understanding how to use my learning style information will improve my study strategies.	1	2	3	4	5
29. Understanding my learning style will help me be more successful as a student nurse.	1	2	3	4	5
30. Understanding my learning style will help me earn better course grades.	1	2	3	4	5
31. I am able to explain what being a *visual* learner means.	1	2	3	4	5
32. I am able to explain what being an *auditory* learner means.	1	2	3	4	5
33. I am able to explain what being a *tactile* learner means.	1	2	3	4	5
34. I am able to explain what being a *group* learner means.	1	2	3	4	5
35. I am able to explain what being an *individual* learner means.	1	2	3	4	5

36. I plan to use my learning style information.	1	2	3	4	5
37. Applying my learning style information will help me to be successful in my nursing program.	1	2	3	4	5
38. Using the learning style information will facilitate my learning.	1	2	3	4	5
39. I think about how I might utilize my learning style information in the classroom.	1	2	3	4	5
40. I think about how I might utilize my learning style information in the clinical setting.	1	2	3	4	5
41. Applying learning style information will help me achieve good grades in my courses.	1	2	3	4	5
42. Using my learning style information will help me to be successful on NCLEX.	1	2	3	4	5

43. Please comment on how you plan to use the learning styles information?

Type here

APPENDIX B

TABLE OF RELIABILITY, STANDARD ERROR OF MEASUREMENT, AND SPEARMAN-BROWN PREDICTED RELIABILITY FOR SELF ASSESSMENT SUBSCALE SCORES (ATI, 2000)

Content Area and Subscale	# items	Coefficient Alpha	*SEM*	Spearman-Brown Predicted Reliabiltiy
Critical Thinking (*n*=40)				
Open-minded	6	.4134	1.8598	.8245
Flexible	8	.6094	2.1214	.8864
Rational	8	.5227	2.2052	.8941
Inquisitive	7	.5546	1.9773	.8768
Intuitive	4	.3610	1.6460	.8496
Reflective	7	.5249	1.8542	.8632
Learning Styles (*n*=45)				
Visual	8	.4747	2.4920	.8356
Auditory	7	.3084	2.6963	.7414
Tactile	9	.4479	3.0519	.8022
Individual	11	.5426	2.9280	.8291
Group	10	.5846	2.8613	.8636
Personal Characteristics (*n*=50)				
Communication Skills	10	.6041	2.6920	.8841
Stress and Coping	18	.7941	4.0590	.9146
Integrity	10	.6644	2.4892	.9082
Nursing Understanding	12	.2925	3.1101	.6327
Work Values (*n*=60)				
Initiative	13	.6191	2.7374	.8823
Motivation	7	.5840	2.7978	.9233
Self-esteem	12	.6563	4.6745	.9052
Time Management	10	.5653	4.0873	.8864
Leadership	10	.2605	3.1662	.6788
Problem Solving	8	.5625	2.9772	.9060

APPENDIX C

INSTITUTIONAL REVIEW BOARD APPROVAL

INDIANA UNIVERSITY

OFFICE OF RESEARCH ADMINISTRATION

Date:	October 17, 2009
To:	Dr. Diane Billings Nursing NU
From:	Regina Wininger Research Compliance Administration, IUPUI UN 618
Subject:	IUPUI/Clarian Institutional Review Committee - Exempt Review of Human Study
Study Number:	EX0910-20B
Study Title:	Variables Associated with the Intent to Use Learning Style Preference Information by Undergraduate Nursing Students

Your application for approval of the study named above has been accepted as meeting the criteria of exempt research as described by Federal Regulations [45 CFR 46.101(b), paragraph 2]. A copy of the acceptance is enclosed for your file.

Although a continuing review is not required for an exempt study, prior approval must be obtained before change(s) to the originally approved study can be initiated. When you have completed your study, please inform our office in writing.

If the research is conducted at or funded by the VA, research may not be initiated until approval is received from the VA Research and Development Committee.

Please contact the Office of Health Care Billing and HIPAA Programs at 317-278-4891 for information regarding a Data Use Agreement, if applicable.

Enclosures: ☒ Copy of acceptance

Phone: 317-274-8289 • Fax: 317-274-5932 • Email: resrisk@iupui.edu • Website: http://research.iupui.edu

APPENDIX D

INVITATION TO PARTICIPATE LETTER TO DEAN OR DIRECTOR OF NURSING PROGRAM

Subject line: Access to BSN students for Learning Style Research

Dear Program Dean, Director or Department Chair (place correct name and title):

As a requirement for my doctoral degree at Indiana University School of Nursing, I am conducting a research study entitled, *Variables Associated With Intent to Use Learning Style Preference Information by Undergraduate Nursing Students.* I am interested in surveying baccalaureate students' intent to use learning style preference information after they have been assessed by the ATI Self Assessment Inventory administered by your nursing program. I plan to begin data collection at the end of October 2009.

Eligibility criteria for students are:

- Enrolled in a four-year BSN program or
- Enrolled in an accelerated BSN program
- Students must have taken the ATI Self Assessment Inventory (SAI)
- Students must have been informed of their ATI SAI results

Student responses to the questionnaire which includes a demographic profile will be anonymous and confidential. Nursing programs and student names will not be identifiable. The questionnaire will be accessed through SurveyMonkey, a secure online survey system. A hypertext link will be included as part of an email invitation which you would forward to your students.

I will interpret student's consent to participate in the IRB approved study to be granted when they answer the questionnaire on SurveyMonkey. All results will be aggregated to protect participants. This survey is being conducted under IRB approval from Indiana University, dated October 17, 2009, Protocol Number: EX0910-20B. The IRB document is attached for your review.

You will be provided a copy of the findings of the study which I believe will benefit your program of nursing. Please contact me using the information below or Dr. Diane Billings, xxxx@iupui.edu if you have any questions. If I do not hear from you prior, I will be contacting you in about one week from the date of this email to establish your willingness to participate.

Thank you for your time and consideration. My research can only be successful with your help to facilitate and encourage students to complete this survey.

Sincerely,

Nancy Burruss, RN, MSN, CNE
Associate Professor
BSN Program Director
Bellin College
3201 Eaton Road
Green Bay, WI 54311
xxxx@bellincollege.edu
phone: 920-433-6623
fax: 920-433-1921

APPENDIX E

EXPLANATORY LETTER TO THE DEAN, DIRECTOR OR DESIGNATED

CONTACT PERSON

Subject line: Student Survey on Learning Style Preferences

Dear Program Dean, Director or designated contact person (place correct name and title):

Thank-you for agreeing to participate in my research study entitled, *Variables Associated with Intent to Use Learning Style Preference Information by Undergraduate Nursing Students*.

In order to optimize students' response rate, I would like to send a series of four email contacts to potential participants. The initial contact would be an email from you letting prospective participants know about the study. One week later, I would ask that you forward my letter of invitation to participate in the study, which includes a link to the questionnaire. To increase the response rate, I would ask that you then follow up with two reminders, each 1 week apart.

If you have questions or comments about the study, please contact me using the information below or Dr. Diane Billings, xxx@iupui.edu if you have any questions.

Thank you for your time and commitment to this study. My research can only be successful with your help to facilitate and encourage students to complete this survey.

Sincerely,

Nancy Burruss, RN, MSN, CNE
Associate Professor
BSN Program Director
Bellin College
3201 Eaton Road
Green Bay, WI 54311
xxxx@bellincollege.edu
phone: 920-433-6623
fax: 920-433-1921
www.bellincollege.edu

APPENDIX F

FIRST CONTACT EMAIL TO PARTICIPANTS FORWARDED TO STUDENTS BY DEAN/DIRECTOR/DESIGNEE

Subject line: Student Survey on Learning Style Preferences

Dear Student:

Next week, you will receive an email requesting that you complete an online questionnaire for an important research project being conducted by Nancy Burruss, a doctoral student at Indiana University School of Nursing in Indianapolis. This study concerns variables associated with the intent to use learning style preference information by undergraduate students.

I am sending you this email so you know ahead of time that I will be forwarding to you Ms. Burruss' questionnaire for you to fill out. This study will help BSN nursing programs to understand the importance of learning style preference information as it relates to you, the student. Your participation is voluntary and in no way will affect your progress in your nursing program. Your results will not be shared with our nursing program, it will be strictly confidential. There is minimal risk of harm or discomfort, no more than ordinarily encountered in daily life.

Thank you for your time and consideration. It is only with the generous help of students like you that nursing research can be successful.

Sincerely,

Dean/Director/Designee signature

APPENDIX G

SECOND CONTACT EMAIL LINK TO SURVEY FROM RESEARCHER

Subject line: Student Survey on Learning Style Preferences

Dear Student:

As part of the PhD program at Indiana University Purdue University Indianapolis, I am conducting a research study on variables associated with students' intent to use learning style preference information. As part of your nursing program, you have taken the ATI Self Assessment Inventory which measured your learning style preferences. I would like to know from you what you know and understand about that as well as what your intent to do with that information. This study will help nurse educators to understand the value of learning style preference information for their students enrolled in BSN programs.

I have received approval from the Indiana University Institutional Review Board. If you choose to participate, you will be asked to fill out one student survey that is hyperlinked to this email. This survey has been validated by other BSN students. The survey data will be kept strictly anonymous and confidential. No individual student data will be shared with your school. My results will reflect the total sample not individual responses. I estimate it will take about 10-15 minutes to complete the survey. Completion of this survey is voluntary. You may refuse to participate or withdraw at anytime without penalty. There is minimal risk of harm or discomfort, no more than ordinarily encountered in daily life.

I will interpret your consent to participate in this study to be granted when you answer the online survey on SurveyMonkey. Refusing to participate or incomplete survey completion will not result in any penalty of grade or other benefits to which you are entitled in this class. Your instructor will not be involved in any of the data collection procedures.

If you have any questions or would like a copy of the findings of the research, please contact me using the information provided below or Dr. Diane Billings, xxx@iupui.edu if you have any questions. Thank you, in advance, for completing this survey within the next few days.

Begin the survey by clicking on the link below:
(hypertext link to SurveyMonkey)

Sincerely,

Nancy Burruss, RN, MSN, CNE
Indiana University Doctoral Student
xxx@bellincollege.edu
920-433-6623

APPENDIX H

THIRD CONTACT EMAIL TO PARTICIPANTS (ONE WEEK FOLLOW-UP)

Subject line: Student Survey on Learning Style Preferences

Dear Student:

Approximately one week ago, you were sent an email regarding my research survey that asked about your knowledge and comprehension of and intent to use your learning style preferences information. If you have already completed and submitted this online survey, I sincerely thank you!

If you have not taken the survey yet, it will take approximately 10-15 minutes of your time. Please take the time to complete this survey. Your input is so valuable to the work I am doing and it is only by your responses to the survey that I can be confident that the results are truly representative of BSN students in nursing programs.

If you have any questions, please feel free to contact me at the contact information below or Dr. Diane Billings at xxx@iupui.edu.

Please begin the survey by clicking on the link below:
(Hypertext link to SurveyMonkey)

Sincerely,

Nancy Burruss, RN, MSN, CNE
Indiana University Doctoral Student
xxx@bellincollege.edu
920-433-6623

APPENDIX I

FOURTH CONTACT EMAIL TO PARTICIPANTS (TWO WEEK FOLLOW-UP)

Subject line: Student Survey on Learning Style Preferences

Dear Student:

Approximately one week ago, you were sent an email regarding my research survey that asked about your knowledge and comprehension of and intent to use your learning style preferences information. If you have already completed and submitted this online survey, I sincerely thank you!

If you have not taken the survey yet, it will take approximately 10-15 minutes of your time. Please take the time to complete this survey. Your input is so valuable to the work I am doing and it is only by your responses to the survey that I can be confident that the results are truly representative of BSN students in nursing programs.

If you have any questions, please feel free to contact me at the contact information below or Dr. Diane Billings at xxx@iupui.edu.

Please begin the survey by clicking on the link below:
(Hypertext link to SurveyMonkey)

Sincerely,

Nancy Burruss, RN, MSN, CNE
Indiana University Doctoral Student
xxx@bellincollege.edu
920-433-6623

APPENDIX J

ITEM CODE LIST: INTENT TO USE LEARNING STYLE PREFERENCE INFORMATION SURVEY

Categorical Variables			Recoded Variables	
Typeprog	Four year program	1		
	Accelerated program	2		
Gender	Female	1		
	Male	2		
Race	White/Caucasian	1	White	1
	Black/African American	2	Other	2
	Hispanic/Latino	3	(includes 2, 3, 4, 5, 6)	
	American Indian/Alaskan Native	4		
	Asian American/Pacific Islander	5		
	Other	6		
Employed	Yes	1		
	No	2		
TypeWork	Nursing/Healthcare	1	Nursing	1
	Business	2	Other	2
	Education	3	(includes 2, 3, 4, 5, 6, 7)	
	Sales	4		
	Office support	5		
	Other	6		
	None	7		
SAItaken	Orientation	1	Orientation	1
	First semester	2	Other	2
	Second semester	3	(includes 2, 3, 4, 5)	
	Second year	4		
	Other	5		
WhoShare	ATI Coordinator	1	Faculty	1
	Faculty	2	Other	2
	Academic Advisor	3	(includes 1, 3, 4, 5, 6, 7, 8)	
	Director	4		
	Dean	5		
	Staff Member	6		
	Other	7		
	Faculty & Director dual role	8		
HowRec	Individual discussion	1	Group & Printed	1
	Group discussion	2	Other	2
	Printed hardcopy	3	(includes 1, 2, 3, 4, 5, 7)	
	Email	4		
	Other	5		

	Group & Printed	6	
	Email & Other	7	
ReadRes	Yes	1	
	No	2	
InfoRep	Numeric scores	1	Numeric & Interpretation 1
	Interpretation	2	Other 2
	Strategies	3	(includes 1, 2, 3, 4, 6, 7, 8, 9)
	Other	4	
	Numeric & Interpretation	5	
	Numeric, Interpretation & Strategies	6	
	Interpretation & Strategies	7	
	Numeric & Strategies	8	
	Numeric & Other	9	
LSType1	Visual	1	Visual 1
	Auditory	2	Other 2
	Tactile	3	(includes 2, 3)
LSType2	Group	1	
	Individual	2	
Understd	Yes	1	
	No	2	
Useful	Yes	1	
	No	2	
Q23-Q42	SD	1	
	D	2	
	N	3	
	A	4	
	SA	5	

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Zhang, H., & Lambert, V. (2008). Critical thinking dispositions and learning styles of baccalaureate nursing students from China. *Nursing and Health Sciences, 10,* 175–181.

CURRICULUM VITAE

Nancy Marie Burruss

Education:

2010	PhD in Nursing Science Major: Nursing Education Minor: Adult Health Mentor: Dr. Diane Billings Indiana University, Indianapolis, IN
1986	Master of Science Degree in Nursing. Major: Clinical Nurse Specialist-Medical/Surgical. Adelphi University, School of Nursing, Garden City, NY
1979	Baccalaureate Degree in Nursing with Honors. University of Illinois Medical Center, College of Nursing, Chicago, IL

Professional Experience:

BSN Program Director
Associate Professor
Bellin College
Green Bay, WI
July 1, 2007 - Present
Assist with the administration of the undergraduate nursing program. Monitor academic progression and retention of approximately 285 students. Collaborate with academic team to ensure effective planning, implementation, and evaluation of the undergraduate nursing program.

Assistant Professor
Bellin College of Nursing
Green Bay, WI
February 1994 - June 30, 2007
Provide theory, lab and clinical instruction in sophomore and senior level nursing courses: Health Assessment, Pathophysiology I and II, Professional Practice Issues, Advanced Cardiac Care, and Advanced Concepts in Nursing Care of Adults.

Staff RN
Intensive Care Unit (2nd and 3rd floor ICU)
Aurora BayCare Medical Center (ABMC)
Green Bay, WI
June 2003 - February 2005
Provided direct patient care to critically ill cardiac, neuro and medical-surgical patients/families.

Staff RN
Critical Care Unit (CCU)
Bellin Health Center Hospital
Green Bay, WI
June 1999 - May 2003
Provided direct patient care to critically ill patients/families.

Clinical Nurse Specialist
Cardiothoracic Surgery
The Harris Chassanoff Heart Institute
Long Island Jewish Medical Center
New Hyde Park, NY
July 1983 - April 1993
Case management of in-house and outpatient cardiothoracic patients and families; daily patient rounds assessing patient progress; emphasis on strong interpersonal skills, communication, problem solving and daily coordination of patient care; clinical visibility serving as advanced practitioner and consultant; directed treatment decisions and nursing care regimes; developed and implemented standards of nursing practice; provided formal and informal education to patients, staff and students; conducted quality improvement activities; conducted research activities; and precepted students.

Research Coordinator
Consulting Surgeons, Inc.
720 S. Van Buren
Green Bay, WI
July 1995 - June 1996
Coordinated the development and distribution of a research questionnaire designed to measure quality of life and work related outcomes after cardiac surgery.

Consultant, Professional Education Services
Baxter Healthcare Corporation
Edwards Critical Care Division
Irvine, CA
October 1992 - 1996
Provided education and consultation to critical care clinicians on new hemodynamic technologies developed by Baxter.

Adjunct Assistant Clinical Professor
Adelphi University–School of Nursing
Garden City, NY
January 1987 - December 1989
Provided direct clinical supervision to graduate nursing students.

Staff RN
Heart Surgical and Intensive Care Units
Long Island Jewish Medical Center
New Hyde Park, NY
October 1981 - July 1983

Staff RN
Progressive Care Unit
Long Island Jewish Medical Center
New Hyde Park, NY
June 1979 - October 1981

Publications:

Burruss, N., Billings, D., Connors, H., Skiba, D., & Brownrigg, V. (2009). Class size and the use of technology, educational practices and outcomes in web-based nursing courses. *Journal of Professional Nursing, 25*(1), 33 - 41.

Holz, S., Reifschneider, E., & Burruss, N. (2009). Faculty achievement tracking tool. *Journal of Nursing Education,48*(3), 161 - 164.

Burruss, N., & Holz, S. (2005). Managing the risks of thrombocytopenia. *Nursing2005, 35*(6), 32hn1 - 32hn5.

Burruss, N., & Holz, S. (2005). Understanding acute pancreatitis. *Nursing2005, 35* (3), 32hn1 - 32hn4.

Burruss, N. (2004, August). Nursing malpractice 101, *American Association of Critical Care Nurses-NEW Chapter,* http://www.aacn.org/Chapter/wisconsin.nsf

Burruss, N. (2004, January). The role of nurses in the optimal management of the AMI patient. CME approved monograph for *IMPACT (Individualizing Management Protocols for Acute Coronary Syndrome Treatment*. Medical Decision Point, a division of Dowden Health Media, Inc. and Dannemiller Memorial Education.

Burruss, N. (2002, August). The WSNA breakthrough to nursing project: Touched by a nurse, *The Critical Connection*, *30*(1), AACN-NEW Chapter.

Scott, C., Burruss, N., Kalimi, R., Manetta, F., Palazzo, R., & Graver, M. (2001). Acute aortic dissection during pregnancy. *American Journal of Critical Care, 10*(6), 430 - 433.

Burruss, N. (1995, May 10). Bellin College of Nursing salutes preceptors, *The Midweek Update,* Bellin Health Center Hospital.

Burruss, N. (1993). Aortic dissection: Diagnosis and acute-care management. *Cardiovasc Nurs, 29*(6), 41 - 51.

Scott, C., & Burruss, N. (1990). *Thoracic surgery*. Department of Public Affairs, LIJMC: New Hyde Park, NY.

Burruss, N. (1988). *Heart surgery*. (3rd ed.) Department of Public Affairs, LIJMC: New Hyde Park, NY.

Burruss, N. (1988). *Caring for yourself after heart surgery***.** (3rd ed.) Department of Public Affairs, LIJMC: New Hyde Park, NY.

Professional Presentations:

Jan. 2009	Poster presentation "Implementation of Teaching Strategies for the Active Learner", Faculty Development Day, Bellin College
Mar. 2007	Poster presentation "Class Size and the Use of Technology, Educational Practices and Outcomes in Web-based Nursing Courses", Midwest Nursing Research Society (MNRS), Omaha, NE
Jan. 2007	Poster presentation "Faculty Achievement Tracking Tool", Innovation and Evaluation: Opportunities and Obstacles, UW-Madison
Mar. 2006	Podium presentation "Social Presence in the Online Environment", Sigma Theta Tau Scholarship Day, UWGB
Nov. 2004	Poster presentation "Utilizing Simulation Technology to Enhance Health Care Provider Competency" at Greater Twin Cities Area Chapter (GTCAC) AACN Fall Symposium, Edina, MN
Oct. 2004	Poster presentation "Utilizing Simulation Technology to Enhance Health Care Provider Competency", Wisconsin Nurses Association (WNA)

Research Experience:

Principal Investigator
D752 Research practicum for PhD at Indiana University School of Nursing: Class Size and its relationship to use of technology, educational practices and outcomes for undergraduate and graduate nursing students. (Summer 2006)

Reviewer
Small grant proposals for Sigma Theta Tau—Kappa Pi Chapter. (Feb. 2006)

Research Mentor
Grant proposal entitled: Enhancing ICU Outcomes and Nursing Satisfaction through Technology Integration with the Virtual ICU. (Jan. 2006)

Principal Investigator
The Effect of a Preoperative Education Booklet on Preoperative and Postoperative State Anxiety in Coronary Artery Bypass Patients. (Spring 1986)

Research Coordinator
Measurement of Quality of Life and Work Related Outcomes Following Cardiac Surgery. (1995 - 1996)

Research Coordinator
Difference in Pain Relief between Tylenol #3 and Darvocet When Given to Postoperative Cardiac Surgical Patients? (1992 - 1993)

Data Collector
Administered questionnaires, interviewed patients, reviewed patient records, obtained blood samples and logged data for various medical studies. (1986 - 1988)

Professional Development (last four years):

May 10 28th Annual Cardiovascular Conference, *New Concepts in Cardiovascular Care*, Bellin Health Systems, 5.5 contact hours.
Mar. 10 *The 2010 NCLEX-RN Exam and Your Curriculum*, Elsevier Faculty Development and Training webinar.
Oct. 09 *The History and Role of the DNP in Nursing Education and Practice*, Bellin Health Systems, 1.0 contact hours.
Oct. 09 *Simulation in Nursing Education*, Bellin Health Systems, 1.0 contact hours.
May 09 27th Annual Cardiovascular Conference, *Brave Heart: Fighting for a Healthy Heart*, Bellin Health Systems, 6.5 contact hours.
Feb. 09 *Safeguarding Against Nursing Never Events*, Advisory Board Company, 4.0 contact hours.
Jan. 09 *Implementation of Teaching Strategies for the Active Learner*, Bellin College, Faculty Development Day.
Jan. 09 13th Annual Faculty Development Conference, *Creative and Critical Thinking*, University of Wisconsin Green Bay.
Oct. 08 2008 Wisconsin Nursing Law Conference, Southwest Seminars Association, 5.0 contact hours.
May 08 Nursing Faculty Simulation Development Workshop, Chippewa Technical College, CE 0.6 hours.
Mar. 08 Nursing Scholarship Day 2008, Kappa Pi Chapter-at-Large of Sigma ThetaTau, 3.91contact hours.
Nov. 07 *What has evidenced-base practice done for you lately?*, Kappa Pi Fall Meeting.
Sept. 07 NLN Education Summit 2007, *Evolution or Revolution: Recreating*

Nursing Education, 16.5 contact hours.

Sept. 07 NLN Presummit Workshop, *NLN Prep Course for Certification as a Nurse Educator*, 6.0 contact hours.

May 07 25th Annual Cardiology Conference, *Future of Cardiac Care*, Bellin Health Systems, 6.25 contact hours.

Mar. 07 31st Annual Midwest Nursing Research Society, Omaha, NE, 17.0 contact hours.

Jan. 07 *Innovation and Evaluation: Opportunities and Obstacles*, University of Wisconsin Madison, 7.0 ANCC contact hours.

Selected Accomplishments:

- Nominated for the Nishioka Family Faculty Excellence Award 2010.
- Book reviewer, Bradshaw & Lowenstein. (2007). *Innovative Teaching Strategies in Nursing*. Jones & Bartlett Publishers.
- Awarded the 2005 - 2010 Paul Ziemer Memorial Cardiovascular Nursing Professor.
- Awarded the Nishioka Family Faculty Excellence Award 2006.
- Nominated for the Nishioka Family Faculty Excellence Award 2005.
- Book reviewer, Cherry & Jacob. (2005). *Contemporary Nursing: Issues, Trends & Management*. Elsevier Mosby Publishers.
- National Nurse Advisor for IMPACT (Individualizing Management Protocol for Acute Coronary Syndrome Therapies), (2003-2005).
- Book reviewer, Gutierrez & Peterson. (2002*). Pathophysiology: Real World Nursing Survival Guide*. WB Saunders Publishers.
- Awarded AACN-NEW Chapter, Member of the Year 2003.
- Book reviewer, Cherry (2002). *Contemporary Nursing: Issues, Trends & Management*. (2nd ed.). Mosby Publishers.
- Awarded the Philip & Betsy Hendrickson Annual Cardiovascular Professor 2002-2004.
- Book reviewer, Porth (2002). *Pathophysiology: Concepts of Altered Health States*. (6th ed.). Lippincott, Williams & Wilkins Publishers.
- Chapter reviewer, Morton (2002). "Building a Professional Practice Model for Excellence in Critical Care Nursing" in *Critical Care Nursing: Holistic Approach*. (8th ed.).
- Manuscript reviewer for AACN Clinical Issues Advanced Practice in Acute and Critical Care Journal (April 1996 - 2000).
- Nominated for New York State Nurse of Distinction award May, 1991.
- Awarded Center of Excellence - Clinical Nurse Specialist of the Year 1990.
- Featured on News Channel 12 TV station to discuss the advanced role of the clinical nurse specialist and new technologies in cardiac surgery, May 5, 1991.
- Designed the Critical Care Flow Sheet and Patient Teaching/Learning Flow Sheets.
- Creator of the "Coughing Pillows" used by cardiothoracic patients.
- Established the first in-patient physical therapy program for the cardiothoracic patients.

- Member of the Editorial Board of the Journal of Cardiovascular Nursing (term ended Sept. 1989).
- Reviewed manuscripts for the Journal of Cardiovascular Nursing (April 1987 – Sept. 1989).

Professional Affiliations:

National

Midwest Nursing Research Society (MNRS)
Sigma Theta Tau-Kappa Pi Chapter-At-Large
Board of Directors (2002 - 2003)
Research Committee (2002 - 2006)
Finance Committee
Chairperson (2002 - 2003)
National League for Nursing (NLN)
American Association of Critical Care Nurses (AACN) (1981 - 2008)
National
N.E.W. AACN Chapter
Board of Directors (2002 - 2005)
Annual Seminar Chair (2003 - 2006)
American Heart Association
Heart Ball 2001 Committee Member
Council of Cardiovascular Nurses (AHA)

Bellin College, School of Nursing

Curriculum Committee
Chairperson, Curriculum Committee (2007 - 2008)
Faculty of the Whole
Faculty Senate
Technology Advisory Committee
Interinstitutional Graduate Community Advisory Committee
Interinstitutional Clinical Agency Committee
Interinstitutional Administrative Committee - St. Norbert College
Interinstitutional Academic Coordinating Committee - UWGB

Certifications:

Certified Nurse Educator (CNE)
Awarded by National League for Nursing (NLN), through 2012

Clinical Specialist in Medical Surgical Nursing, APRN, BC
Awarded by American Nurses Credentialing Center
September 1999 to August 2004
Recertification awarded September 1, 2004 to August 31, 2009

CCRN-Critical Care RN awarded by American Association of Critical Care Nurses

February 1987
CCRN recertification awarded 1990 - 2005

ACLS recertification awarded, Sept. 2001, 2003
Advanced Cardiac Life Support (ACLS) Certified, May 1999
Basic Cardiac Life Support (BCLS) Recertified, yearly